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EDMUND RUFFIN, EDITOR AND PROPRIETOR.

REMARKS ON THE SOILS AND AGRICULTURE OF GLOUCESTER COUNTY.

By the Editor.

[Continued from page 178 of this volume.]

One of the most interesting objects which I visited in Gloucester, was Rosewell, the residence of the distinguished patriot John Page, Governor of Virginia, and of his family preceding and succeeding him. The house is situated on the border of York river, and commands an extensive view over the deep blue waters and the clean white beach of that most beautiful of all our wide waters. The land, though said to be good, and productive, as a farm, considering its long neglected state, presented nothing which attracted my notice, or diverted attention from the ancient and venerable building, to see which, was the object of my visit. The walls of the mansion-house form a cube of 60 feet. The roof is flat and covered with lead, except the central and more elevated parts, which are so low, however, as to be hidden from the outer view by the surrounding parapet wall of about 3 or 4 feet high. The style of building is plain and simple. Though the materials were of the best kind, and the construction and decoration such as must have been very costly, still the whole appearance is as plain, as if embellishment and display were not only not sought, but despised by the builder. It is said that the massive walls contain about a million of bricks; most of which, according to the fashion of old times, were brought from England. The interior walls of all but the upper apartments are wainscoted with black-walnut to the ceiling, and the balustrade of the great staircase is of mahogany, richly carved. All appears simple and severe, and yet grand, and nothing seems designed for ornament, or ostentation. The chimneys, which so much disfigure all modern buildings, are here so massive that they seem more like the turrets of the ancient structures of the feudal age; and the resemblance is further increased by two small circular erections in the roof; one of which is the upper end of the flight of stairs, and the other a sort of observatory, where the extensive prospect and refreshing sea-breeze might be enjoyed in the greatest perfection. Altogether, the Rosewell house bears not a very faint resemblance to an ancient baronial castle; and, except the ivy-capped ruins of the old Jamestown church, (under whose shade these lines are pencilled,) I have never seen any structure so venerable in its form, and in its progress to decay. Both these buildings, and some others on hallowed spots, ought to be made public property, by purchase, and preserved, both from decay, and from any repairs except such as might be necessary to preserve the present appearance. Rosewell house overlooks a wide expanse, rich and beautiful by nature, and now deformed and impoverished by both the abuse and neglect of man; and it stands alone, in solemn grandeur, though undervalued and in decay, an emblem of the old aristocracy of Virginia, of which, with all its virtues and vices, its wealth, refinement, and wastefulness, there is now so little left, and that little fast fading away.

But though in comparison to its former state, the Rosewell house may now be considered in a state of dilapidation, still, as a residence, for the present, it has not greatly suffered by decay. The principal injury sustained, and which threatens future destruction to the interior of the building, if not soon guarded against, is the partial sinking of the ceiling of the great hall, on the lower floor, and which takes away the support of the second and third floors above the place of failure. A timely support by a central pillar would prevent the further progress of this injury. The present owner, and recent purchaser of this estate, Mr. Booth, besides the convenience of keeping his own residence in comfortable repair, doubtless feels the inclination to preserve this noble monument of ancient times. But the expense necessary for this purpose would exceed the cost and present valuation of the whole estate; and there are few individuals, in this utilitarian age, who would be willing to bear this burden. The estate, containing more than 1000 acres of land, was sold at auction a few years ago, for $11,000; and was bought by Mr. Booth, for a small advance on that price. This is not more than the bricks of the mansion house alone would cost; and the probable future destiny of this building, will be, after falling into complete decay, to be demolished, for the use of the remaining materials. Such has already been the end of another building, not far distant, which not many years ago was not less an interesting object as a venerable ruin, than hallowed by historical events. This was the once splendid mansion of the old Secretary Nelson, uncle to the patriotic Governor Nelson, in Yorktown, which in the beginning of the siege was the quarters of Lord Cornwallis and his principal officers. The walls were perforated in many places by the cannon balls from the batteries of the besiegers; which in part were so directed by the special orders of Governor Nelson, then commanding the Virginia militia, and who dealt the same measure to his own dwelling-house, though that was better protected by distance, and its more humble size; and it still stands, the best remaining building in the decayed and almost deserted village of Yorktown. Secretary Nelson was then confined by disease to his house, which stood in an angle of the British interior intrenchment, and directly in the most important line of defence, and attack, and therefore peculiarly exposed. His three sons, as well as his nephew the governor, were in arms among the besiegers; and he was at last permitted to take refuge in the American camp, on a flag of truce being sent for that purpose by Washington, and borne by one of the Secretary's sons. Before his removal, one of his servants, in the same apartment with his master, and while speaking to him, was killed by a ball from the besiegers' cannon. Though the house was made a ruin by the fire of the American batteries during the siege, it long remained one of the objects of highest interest on

this ground, which is altogether so interesting as the closing scene of the war of the American revolution; and twenty-seven years ago, when I first saw it, the greater part of the outer walls and three of the chimneys were still standing. All has since been demolished, merely for the use of the materials; and the site is distinguished only by a greater quantity of rubbish, scattered by the side of the British line of defence.

The present owner of Rosewell was not at home; but still I was obliged by the kind welcome which he had prepared for my expected visit. If it was not so much out of the way of travellers, I doubt not but that Rosewell would be considered an object of interest, which would probably expose the owner to many such intrusions as mine, and which would become, by their number, more annoying than welcome.

Gloucester-town, (which has not the semblance of a town,) lies immediately opposite Yorktown; and the former as well as the latter place was fortified by part of the British army under Cornwallis, and invested by a part of the American forces. The remains of four redoubts, which defended the point of land, still are seen, in quadrangular mounds of about 8 feet elevation; and these, like the intrenchments of both besieged and besiegers surrounding Yorktown on the opposite side of the river, and even the large holes in the ground which were made by exploding bomb-shells, will probably continue visible until Yorktown itself shall have reached the end of the decay and ruin to which it has long been making progress. Another redoubt, standing alone, is on the road, about a mile from Gloucester Point. This probably was an outpost of the investing force. The mound furnishes an agricultural lesson to those who maintain that any barren sub-soil, brought up by deep ploughing, will become fertilized by exposure. The sandy sub-soil, thrown up in erecting this work fifty-seven years ago, is still bare of vegetation.

The most valuable thing now in Yorktown, (supposing antiquities and historical memorials to be worth nothing,) is the body of rich marl which under-lies the town, and is exposed on the river side. It is perfectly dry, and of a texture more like very soft rock, than shell-marl or earth. It is in this that the artificial cavern was made which is called Cornwallis' cave, and which tradition tells was his lordship's quarters after Secretary Nelson's house was no longer habitable. But like most other traditionary accounts, the fact is disputed. When I first saw the cave, in my boyhood, it was entered by a doorway of small size, and consisted of a square apartment, from which another door led to a second room of smaller size. The walls and ceilings were shaped well and neatly; and the firmness of both showed that the excavation might be continued safely, to any extent, without any other props than walls of the marl itself. This quality, and its great richness, would make the bed valuable for shipping marl for sale; which has already been done, without the need of excavating, from a place a few miles lower down. But until within late years, I think it most probable that nobody in York county knew any thing of the composition or value of the earth in question; and still, judging from their works, but little value is yet attached by them to the use of the manure. When I last entered Cornwallis' cave, one of the apartments was nearly filled with fodder, and the other was converted to a hog-sty, which, in the darkness, I could not know by sight, but was soon informed, by the grunting and the stench, of the presence of the successor of Lord Cornwallis.

STATEMENT OF SUCCESSFUL FARMING, ON A SMALL SCALE, ON GLOUCESTER LOW-GROUND.

By the Editor.

The farm of Jefferson B. Sinclair was referred to in the preceding article (at page 181, No. 3,) and the more important of the peculiar circumstances, and qualities of the soil described generally. In addition to what is there stated, as part of a general sketch of the soils and agriculture of Gloucester, and to which I beg to refer, as prefatory to this statement, I will here report more particularly on the labors expended on, and profits derived from, the cultivation of the farm. The choice of this farm for more particular notice, is not directed by any of the considerations which might be supposed usually to operate; and whether it is well or ill-directed, it will at least be manifest to those best acquainted in the county, that the choice of the writer is not directed by considerations of self-interest, or by a desire to pay court to those enjoying high station, or exercising extensive influence. Mr. Sinclair, notwithstanding his considerable gains, is not yet one of the rich men of Gloucester, nor one who makes any pretension to fashionable, expensive, or "stylish" living; neither has his system, or general plan of farming, any thing commendable, nor is its execution of that neat and perfect kind to please the eye, and command admiration. He was quite a poor man, who, by unremitting industry and care, and by making good use of some of the peculiar advantages of his land, has greatly improved both his income and his farm, and who now shows very heavy crops, and derives large profits. Others, in the county, with greater advantages of spare capital, and more extended agricultural information, have performed operations in cultivating or improving their lands far more likely to attract and gratify the observer, and to command his applause. But the past and present circumstances of this farm will better serve to show, by example, the capacity for improvement and increased product of the land, and the profit which may be counted on to reward steady industry and economy. Whatever has been done here is the result of labor, almost alone, at first; and since, of labor united with the capital produced by the earlier bestowed labor.

This farm, as in the foregoing article stated, lies on the shore of Mobjack bay, and, with two or three adjacent farms, forms the "neck" or point between the mouths of Ware and Severn rivers. The greater part of the neck, as well as the greater part of Mr. Sinclair's arable part of it, is so little above the level of the sea, that it has been sometimes, though rarely, covered by storm or gust-tides. The greater part is probably not more than three feet above ordinary high tide.

The father of the present owner was a regular seaman, and in command of a vessel in the merchant service. He came from a very different

kind of farming land, (near James river,) from this, which he settled on in the latter part of his life. No one could be more unfitted to manage the land, by his previous different pursuits, and want of knowledge; to which was added growing blindness, which soon become total. The management of the farm was necessarily left to the entire direction of the overseers; who, instead of extending cultivation over the waste but highly fertile wet land, actually retreated before the invasions of the tilled surface, by water on the lower, and by wire-grass on the drier parts, until nearly the whole had become unproductive and waste. It was in this state that the present owner received his portion, 13 years ago, without a house upon it, and with scarcely any moveable or working capital, except three negroes capable of aiding him by labor. I do not remember positively, but infer, from the great subsequent increase of slaves, that there were also young negro children; but these of course at first were sources of expense and not of income.

The land, then, exclusive of marsh subject to be covered by ordinary tides, was 433 acres. Since, two different adjoining pieces, of the best (chocolate) soil, but excessively worn and abused, have been added by purchase—the first at $12.25 and the second at $20 the acre. These purchases have increased the tract to 500 acres, or a little more. Of this about 150 acres are of the chocolate soil, lying on rich marl, rising so near the surface as often to be touched by deep ploughing; and 350 of gray land, of the ordinary kind of the most worn and reduced in the county—and some of which, even now, is very bare, and appears very mean.

Under all the existing disadvantages, it may be thought that with 433 acres of land, of which 75 were rich and of admirable soil, the owner was well furnished at least with *landed* capital. But this capital was dead, until it could be improved by labor, of which there was very little; or by money, of which there was none at all, until after it had been earned. In addition to the other necessary expenses, the mother of Mr. Sinclair had a life-interest in the land, which he bought for an annuity of $100; which annual charge is still paid. All the then dry and rich land was under the strong wire-grass sod, to the mastery of which the preceding indolent and careless management had yielded the land. The first thing to be done, was to attack and subdue this powerful enemy to cultivation; and without success in which, nothing of value could be effected on the land. The whole team in possession was a horse, a mule, and a pair of oxen; and it was necessary for all four to be hitched to one plough to break up the land under wire-grass. With this large and oddly combined team, and with a boy as driver to aid the ploughmen, no more than four of the five-feet beds could be ploughed in a day. Nevertheless, this slow labor was persevered in until it was rewarded by ultimate success. Now, the land is so free from wire-grass, that a farmer who had suffered from the pest elsewhere, would find it difficult to believe that this land had ever been so completely sodded with its growth. By the frequent cropping of the land, since the breaking up, much has been done for this result; and, as Mr. Sinclair thinks, much more by summer-fallowing (for wheat) at the time when the wire-grass was in bloom—which he considers as his only means for success, and one which may be relied on in general. It is a new and important suggestion. But I still doubt much whether that means, or any other, available as part of a proper rotation, would have been effectual on a more sandy soil, which is much more favorable to wire-grass than a clay loam, like this chocolate soil. The quantity of calcareous matter in this soil, and its fertility, were favorable enough to this growth to make it cover the land, almost exclusively. But it would have had a still greater degree of vigor, and vitality, if the soil had been also sandy. It is proper here to state, that Mr. Sinclair, when suffering most from this growth, visited Weyanoke, to see the very laborious operations of Mr. Fielding Lewis for restraining (for he could not eradicate,) this pest—which were described in the first number of the Farmers' Register. Having learned the whole practice, and paying implicit respect to the authority of Mr. Lewis as a farmer, and to his experience as a wire-grass farmer, Mr. Sinclair returned home and tried sufficiently the same tedious and costly labor, of digging out and removing the roots. But there was so little benefit found from the experiment, that he never repeated it. He therefore thinks that neither to this mode, nor to frequent tillage, but entirely to his ploughing when the grass was in blossom, is he indebted for the destruction of the growth.

The pair of oxen which composed half of the team of the plough used in the first breaking of the wire-grass land, at other times had to draw all the fuel for the family, rails for fencing, and also the materials for building the dwelling-house. They were 6 years old when bought, at $45; and after being regularly at work for about 6 years more, they were allowed to have a summer's grass, at rest, and were then sold, as beef, for $10 more than the pair cost at first.

The shelly land, which was formerly a widespread swamp and pond, the resort and shelter of wild-ducks, is now well drained, and part under heavy growths of wheat and clover, and the balance in fine and mellow tilth, under a young but promising growth of corn. The unusually perfect drainage of this very low surface, I have before ascribed to the open and loose layer of broken shells, which forms the under-stratum, and serves in effect as a complete under-draining of the whole surface soil.

The manuring with the natural compost, or mixture of calcareous and putrescent matter,) which every ditch furnishes, both when first dug, and whenever afterwards cleared out, has been quite extensive. Much manuring has also been done from the farm-yards, and otherwise by the dung of stock. There still remain to be availed of, and which have scarcely been commenced on, for want of labor, not only the rich and unmixed marl lying under the whole of the chocolate soil, and generally within a foot of the surface, (and which the gray land greatly needs as manure,) but also inexhaustible supplies of putrescent matter, in the "sea-ore," or sea-weeds flung by the waves upon the shores, and in pine-leaves from the low sea-pine land, which, though firm, is too low, and too much exposed to the tide, for safe tillage.

If the means for using them were not wanting, there are resources here for durably enriching

every poor acre of the farm in two years. And much has certainly been done towards its fertilization, considering the existing obstacles; although much more remains to be done, and which, for the doing, promises sure and high profits.

What are known as salt-water pines, are the almost entire growth of the still lower land lying between the fields and the bay shore. These pines seemed, to my eye, to be the same kind as the common woods-pine, (short-leaved) of the higher country; but these appear more dwarfish and stinted, as if on a very unkind soil; and they are of remarkably slow growth compared to the pines of the poor upper country. A beneficial effect of this slow growth, is the large proportion of heart-wood, and the longer durability of fences made of this timber. It is thought that the salt drawn up in the growth of the trees conduces to the durability of the dead timber. It is certain that the sap-wood of these, or of any more perishable pines, is made more durable in fences, by having been first left covered in the salt tide-water for six months or more. This is a common practice in this part of the country; and the rails in the fences are so thickly stuck over with attached shells of barnacles, as to show the long continuance of their salt-water immersion.

The belt of pine-forest, though probably not so designed, must be of much benefit to the arable land, by sheltering the crops from the cold and violence of the east winds, coming from the Chesapeake and the Atlantic. The soil on which the pines grow, low as is its level, is of the gray kind; and though, like all the rest, under-laid by the great bed of marl, is sufficiently thick above it, and (judging by the growth) sufficiently acid and poor, to furnish the proper food for pines, unadulterated by the neutralizing quality of the subjacent calcareous earth. It is, however, a singular location for a pine-forest; and, like some other still stronger apparent contradictions, would cause many to doubt the doctrine of calcareous soil being incapable of sustaining pines, and some other common acid plants.

There has been no regular course of crops on this farm, nor any approach, in practice, to what would deserve the name of a rotation. The proprietor, being constrained, in a great measure, by the former foul state of the rich land, which demanded repeated hoed crops—and tempted to draw from it heavily, both by its power to produce, and his own need for the returns—the general course of cultivation has been irregular, severe, and also totally opposed to the established general rules of good husbandry. Still, circumstances well justified this departure from sound theoretical and general rules; and, on the whole, it has probably conduced much to the profit of the farm, and also to its general improvement; for quicker and greater profits served to furnish more labor for improvement, as well as for more effective tillage; for both of which so much labor was wanting. But the time and the circumstances have now arrived, which will make a more regular and meliorating rotation the most profitable here, as well as in most other situations.

Until about seven years ago, Mr. Sinclair had not sown clover, nor had he been induced to desire to commence its culture, from any witnessed prior trials of others in his county. His commencement was determined, not by design, but by accident, or rather by a ridiculous blunder. He had requested the captain of a northern vessel to bring him a peck of flax-seed. By a fortunate mistake of the captain, he brought, instead, as much clover-seed; which was sown, merely because on hand. The product, however, was so good as to induce the continuation and increase of the annual sowing, until the last amounted to $8\frac{1}{2}$ bushels of seed, and the present clover crop covers 60 acres.

But though his clover-culture has been entirely satisfactory in products and in the conjectured clear profits, it has, as yet, furnished almost nothing to the scythe, either for green-food or for hay, nor as green or vegetable manure to the land—except for the latter, so far as may go the mere roots, and the little of the stalks remaining after grazing. Besides the grazing of other farm-stock, there is a large number of hogs fed on clover, from the time it is 6 inches high; and as I heard a neighbor of Mr. Sinclair's charge him with, in some jocular censures of his management, he does not even give his clover a chance to get into blossom. The hogs are not, however, turned upon the whole field, but upon a part separately inclosed by a temporary or moveable fence; and from that they are changed to another, and so on, so as for them to graze all the allotted space in succession.

If about 100 hogs are desired for annual slaughter, then 20 female pigs are left as breeders, and three or four male pigs. It is so arranged that all the pigs are littered in April or early in May, soon after the hogs have been all put upon the young clover. The births are easily thus timed, as the practice is to castrate all the boars soon after the sows are pregnant, and to fatten and kill them, and all the sows also that have had pigs once, the next winter. Thus there is an annual succession of very young breeders, male and female, and no hog ever remains to be as old as two years. Of course there are but the 20 sows, all pregnant, to feed, from killing time to the beginning of grazing on clover, after which, they have no other food, except the gleanings of the wheat and other small-grain-fields after harvest, until put up to fatten in autumn. For five years there had been killed from 75 to 108 hogs annually; not large, of course, but fat, and of good size for family bacon. The annual sales of pork add largely to the income of the farm. In 1835, the fresh pork sold brought $1200, and the weight of the hogs averaged 133 lbs.

Mr. Sinclair made an experiment last winter and spring with his winter-kept hogs, or breeders, which, so far as one experiment may be relied on, seems decisive against letting hogs run at large in woods and marshes, to aid in supporting themselves. In the beginning of winter, the hogs were divided into two parts, as nearly equal as possible, in numbers, sizes, and condition. Those of one division, were suffered to run at large, in the sea-pine woods, and having access to the close adjacent bay shore, and 300 acres of firm marsh; and received every morning, each, one ear of corn, and another at night; or, when shattered corn was used, as much morning and evening as was supposed to be equal to one ear to each hog for each meal. The hogs of the other division were confined to a well littered pen, in which was a close and dry house or shelter, which they could enter at plea-

sure, and be perfectly protected from wet and cold. These could get no food except what was given to them; and that was the same as was given to the others, that is, one ear of corn to each, twice a day. They probably helped their food somewhat from the litter of corn-stalks and wheat-straw, which I suppose were the kinds furnished in part or in whole. The result was, that in spring, when the clover was fit to receive them, the pen-fed hogs were in much the best condition. Some of the others, running at large, had actually died, and al l that lived were poor and lousy.

Now it must be admitted that the want of precision in fixing the quantities of food given, (though *designed* to be equal, and supposed to be as nearly so as such mode of estimating permitted,) detracts much from the otherwise very important value of this experiment. Still, it can scarcely be supposed that one who is so careful, and so successful, in his general management of hogs, could have been much deceived in the details of this experiment, in which, and in the apparent result of which, he has entire confidence. It should be further considered, that if cooked, varied and mixed food, of roots and other vegetables, as well as grain, had been given to the confined hogs, that there is no question but their health and flesh would have been better sustained, at equal or less cost, than by corn alone.

The hogs are all of a cross of the "no-bone" breed upon the common kind; about half-blood of each, which is deemed preferable to the pure no-bone stock. The front edge of the cartilage with which hogs root into the ground, is trimmed off, which entirely stops their rooting.

Having heard the products of this farm last year (1837) spoken of as very considerable, by a neighbor of Mr. Sinclair's, I inquired of him particularly as to the amount made. The grain crops were as follows:

1621 bushels of wheat, made on 80 acres, which is at the rate of 20¼ bushels to the acre: sold at $1 65 the bushel, (and counting reserved seed at same,) amounted to -	$2674 65
600 barrels of corn, from 75 acres, or 8 barrels to the acre, (of which 300 barrels were sold,) say at $3 25 (I forgot to ask the actual price obtained,) -	1950 00
350 dollars worth of pork, lard, and bacon, were also sold; but as the hogs were partly fed on the corn above estimated, I will count half their product as due to the corn, and the other half to the clover, gleanings of wheat field, and the waste corn, not estimated above—which is, - - - - - -	175 00
The smaller articles of product were not noted; but the following, were supposed to be within the amounts actually sold:	
Butter - - - - - - -	90 00
50 lambs at $2 50 - - - - -	125 00
13 grass mutton at $3 - - -	39 00
Whole value	$5053 65

This is exclusive of sundry smaller products sold, as poultry, &c. of which no estimate is made; and of large ones, which though consumed at home, are not less of value as products; as the fodder and other offal parts of corn and other crops. Also the wool and cotton, produced at home, and from which all the slaves are clothed, by spinning and weaving only in weather and times unfit for field labor. This usually very costly part of farm management (or its substitute, buying all the clothing,) is gotten over easily and cheaply; but the credit for this, as well as for much else of value in domestic economy, is entirely due to Mrs. Sinclair, whose aid has been throughout of very great importance in improving the income of the farm. This I may be excused for saying, as it is the report of her neighbors.

There were no calves sold for veal, last year, as usual, (all being kept to increase the stock,) which lessens the amount unfairly, as this is one of the usual products of the farm. The year before, 1836, 15 calves were sold, at $5 each.

Much the greater part of the above amount is composed of sums received for sales actually made; and the much smaller part, only, was of things consumed at home. The results will therefore appear more striking, if the net amount of actual sales is presented alone, as follows:

Deduct for seed, suppose 100 bushels of wheat, at $1 65, leaves for market - -	$2482 65
300 barrels of corn sold, (at price supposed) 3 25 - - - - -	975 00
Pork, bacon, and lard sold - -	350 00
Butter, lambs, and mutton, as stated above - - - - - -	254 00
	$4061 65

If it is further considered that there is nothing to be taken from this sum to buy clothing for the slaves, now increased, by purchase and births, to 40 in number, the net returns will appear still more important.

The laboring force on the farm is now that of 12 slaves. There are now 50 head of cattle, and 107 sheep.

In all things essential to product, or for improvement, the operations of Mr. Sinclair are well executed; but in things not essential, and in every thing having regard merely to appearance, it must be confessed that he is a very careless and slovenly farmer. Nevertheless, in most of these omissions, held so important by all *martinet* farmers, I doubt not that he has been justified, by the sure test of the amount of *net product*. Still, some very manifest exceptions are to be seen, in which neither economy nor convenience have been properly consulted.

To the Editor of the Farmers' Register.

TROPICAL FIBROUS-LEAVED PLANTS.

Washington, D. C., 8th May, 1838.

I have the pleasure to acknowledge the receipt of No. 2 of your periodical of the 1st inst., and hasten to send you some very small samples of foliaceous fibres, or substitutes for common flax and hemp, with the hope that they may excite your minute attention towards the articles and plates on the fibrous-leaved plants. Should you visit Washington during the present session of Congress, and examine the full specimens, now in the committee-room at the capitol, and soon to be

in the agricultural department of the patent-office, I entertain the respectful hope, that you, in common with all intelligent gentlemen who have seen them and studied their history, would coincide with both committees in their estimate of the future importance of the fibrous-leaved plants, to all the worst soils between the Potomac and the Mississippi. Every member of the senate and of the house of representatives, who has visited the committee-room and given the specimens an examination of 5 to 10 minutes' duration, has expressed his sense of their high importance, and his approbation of the reports of the committees. But such visits have been so "few and far between," that it would require two or three years to elapse before the specimens would be seen by a majority of the members of the Congress, although the whole time necessary for a visit from either chamber would not exceed ten minutes. To enable you to form distinct ideas of the origin of the foliaceous fibres sent to you, I refer to plate 1, figs. A, B, C; and of the mode of separating them, to plate 2, figs. A1, A2, N and T. By a further reference to the printed articles in the latter part of the report of the house of representatives, under the heads of *agave sisalana*, *musa abaca*, and *bromelia pita*, a few brief notices of each will be seen.

In your editorial remarks, whose general correctness I acknowledge, there appear one or two statements apparently founded on misconceptions. For example, in speaking of the reports, you say, "but both of them are but second editions, revised, corrected and enlarged, of prior publications made in like manner by order of Congress." The fact is, that in the house report, there are but 26 or 28 pages to which that statement is applicable, and in the senate report, not a single page; and the latter report is merely supplementary to the former report. If you have had much experience in committees of legislative bodies, especially where the committees are composed of numerous members, you will appreciate the difficulty of obtaining a unanimous report, either in matter or manner such as the subject may seem to require. Indeed, the documents annexed to each report, are neither the kind that I would have voluntarily selected myself, nor have they the boundaries I should have given to them, nor have they even the arrangement which the order of dates alone would require. Besides, there are subsequent difficulties, to which I cannot now conveniently allude. With respect to your suggestion, that the business of petitioning annually would be more profitable, if I could get half as much as the clear profits of the printers of the documents, the idea might have been better expressed by saying it would be less ruinous to my interests. Since the 11th February, 1837, when I arrived at New Orleans, to the present period, employed solely in promoting the business of my petition, my cash expenditures have far exceeded the value of any township of land in South Florida, if not the whole cost of printing the reports. And as I have no income independent of my professional labors, the cessation of them doubles my losses.

* * *

H. PERRINE.

P. S. Inclosed are four seeds or beans of the *dolichos tuberosus*, or turnip-bean, or bean-turnip of Yucatan, which produced good edible roots in Baltimore in 1834, although planted as late as the 1st of June.

[With the foregoing letter we received specimens of the prepared foliaceous fibres of the *agave sisalana*, forming the coarse but strong Sisal hemp, those of the *musa abaca*, or finer Manilla hemp, and the still finer and softer pine-apple flax, or prepared fibres of the *bromelia pita*. Of the last, a notice was published in this journal, copied from a late English publication. The sight of these beautiful specimens caused to be formed a much higher estimate of the value of these products, than mere description could have done. We wish success to Dr. Perrine's application to Congress, and to its general objects. We can well sympathize with a man of enthusiastic zeal, who has been for years laboring, without encouragement or success, to serve the cause of public improvement.

The seeds of the turnip-bean have been placed in the hands of a gentleman who will do justice to the experiment of their cultivation.]—ED. FAR. REG.

ANALYSIS OF THE SANTEE MARL.

In the latter part of our fifth volume, (page 693,) there was published a letter from F. H. Elmore, esq. describing the marl found in South Carolina on the banks of the Santee, and which accompanied a specimen of the marl in question. We then, upon very slight examination, merely reported that the marl was very rich; and promised a careful analysis, and a report of the results, at a time of more leisure. We are now enabled to state, from recent examination, that the specimen sent was almost a pure carbonate of lime, as it contained more than 98 per cent. The small residue is of very fine clay and vegetable matter, with a minute proportion of silicious sand. The lump was almost as white, and very similar in other respects, (as it was entirely in chemical composition,) to English chalk; the only certain difference being that the American earth is not fit to mark with, like the English. No true chalk has yet been discovered in this country. From the unexampled richness of this specimen, if considered as *marl*, we strongly suspect that there was sent to Mr. Elmore a specimen of the richest parts, and not one selected fairly to show an average quality. We therefore, without further light on the subject, would place more confidence on the analysis reported by our correspondent J. D., on page 173 of last number, as showing a usual or average strength. That marl was from the same part of the country, and doubtless was part of the same deposite, and contained 88 per cent. of carbonate of lime; which is rich enough to induce even the most lethargic of the South Carolinian land-holders to commence its use. We rejoice to learn, from the statement of J. D., that the reproach which, in this respect, has lain on the otherwise energetic and enthusiastic people of South Carolina—and which we have not been backward in urging against them—is now in course of being removed. For, sure we are, that if marling is once

tried there, and the effects seen, it is impossible but its use will be rapidly extended. Absence from home prevented our seeing the letter of J. D. until it had been printed; or these remarks would have been made at the time of its publication.

FROM THE PROCEEDINGS OF THE PLANTERS' SOCIETY OF MONTICELLO, S. C.

Report of the Petitioning Committee.

To the Monticello Planters' Society—

At your last meeting, a committee was appointed to petition the Legislature, on behalf of this Society, that it be incorporated, and such other encouragement given, as the State Assembly, in its wisdom, might deem proper. It surely is within the ordinary range of legislative business, to grant Acts of Incorporation: but what is meant when the planter asks for legislative encouragement? On this point, your committee, acting in perfect accordance with your expressed wishes, prayed the state to adopt some course, which would advance the agricultural interests of the whole community—such a course too, as in its results, could not have been construed into an act of partial legislation. We petitioned that body more particularly to appoint a state agricultural surveyor, who should be required to survey our territory, that its entire geological and mineralogical resources might thus be developed; and also asked that agriculture should form a necessary branch of education in our schools and colleges. The committee were well aware, that this society, of itself, required no legislative aid, farther than the mere act of incorporation would imply: it will be seen by the last "acts of assembly," this request has been granted, but nothing beyond that was accomplished. The agricultural movements of South Carolina, in her legislative capacity, are unquestionably to be regarded in any other light than creditable, or, we might add, even respectable.

In similar instances, what has been the action of a few of the other states of the confederacy? In 1836, Maine *imported* 150,000 bbls. of flour: her legislature votes a bounty to the wheat-grower; and the consequence is, her barren lands yield a doubled produce for domestic consumption, *with a large surplus for exportation*. Connecticut has also been benefited in her agriculture, through her legislators *acting* as if they thought the planter within the pale of some legislative protection or cognizance. Massachusetts, within the last two years, has ordered a general agricultural survey of her domain. North Carolina, "according to the report of the civil engineer in 1826," had a vast quantity of lands "covered with waters," and susceptible of being reclaimed: recently, she has voted upwards of $200,000, to be expended in draining off these waters, that lands so fertile might be thrown into cultivation. The Editor of the Farmers' Register (from whose periodical much of the detail in this report is collected) has been using no ordinary zeal and ability to bring this subject in its proper bearing before the Virginia assembly; but Virginia as yet has done possibly less in this way, than South Carolina.

Not twelve years ago, "the Agricultural Society of South Carolina" was founded: it promised exceeding fair things, though like many other bubble societies, it scarcely outlived its organization. About the same time, Dr. Cooper presented a document to the legislature, in which he very forcibly urged the expediency of establishing an agricultural professorship in the college over which he then presided: the subject-matter of that document, we presume, was perhaps too utilitarian for the consideration of legislators, whose tenure of office was held at the pleasure of those very planters, whose social and political condition the report was designed no doubt to reach and improve. If there was a necessity *then* for an amelioration of the planter's pursuit, your committee would suppose the occasion more imperatively demands it *now*, when our lands are impoverished, and our population absolutely driven, by state policy, to seek their fortunes in the fields of the west. When Washington recommended an American agricultural board on the English plan, he in all likelihood could have little dreamed that the almost unbounded territory, to which he gave birth, would in less than a century be importing breadstuffs, to support a comparatively sparse population; yet such is the fact, disgraceful as it may seem. It is proper, it is obligatory on the states within their own limits, to apply the remedy to counteract this or any like evil: and so far as South Carolina is concerned, your committee conceive that, as she takes the usual care to collect the landholder's tax, she should be willing to return some sort of equivalent.

All which is respectfully submitted.

B. F. Davis, *Chairman, pro tem.*

March 7th, 1838.

CORRECTION OF A MISTAKE. CROPS ON THE RIVANNA.

To the Editor of the Farmers' Register.

May 16th, 1838.

On a late visit from an old and highly esteemed friend of the county of Culpeper, who, from the situation and character of my farm, was led to enquire into the authorship of a piece signed "Rivanna," appearing in the January No., 1836, of your Register—I was induced to correct a false impression which I learned had been made in his section of country, as to the produce in corn of a certain field, the subject of the above communication. This impression was derived from a difference in the mode, not of measuring, but of *counting* measure, in the two countries—in his, by bushels, in ours, by barrels—where, as in Culpeper, we allow five bushels of shelled corn, and twice that quantity of ears, to the barrel. The specification *ears*, was used merely in exclusion of nubbings, of which there was the usual proportion (not counted) in this crop.

In making this explanation, I am constrained by a sense of the importance of particularity in all such communications—considering a departure from it the height of injustice to our fraternity, and to the cause of agricultural improvement—

to correct a trifling error which in some way had crept into the calculation of product of the field alluded to. As some salvo, however, to the pride of veracity and of *counting* of "Rivanna," he has at command data which establish the yield per acre on a fraction less than sixty, to have been twelve barrels, one bushel, and one peck—making the whole quantity, as before reported, 740 barrels of shelled corn. This result was ascertained by a gentleman of high character and acquirements, from the most accurate measurement of square pens containing about 200 barrels each, built with workmanlike precision of straight pine poles; and calculated according to the most approved mode of gauging; which, after corn has *settled*, (particularly in large pens,) will overrun considerably on being measured out by the *tub*.

You will, I hope, Mr. Editor, excuse my having *raked* up an old subject, which might have been allowed, like its own stubble, to die a natural death; but having given to it in the first instance "a local habitation," I feel in the spirit which then prompted me to obtrude it on your readers, a resolute determination to aid in rescuing this portion, at least, of the state in which I live, from an opprobrium that has for more than half a century rested on it—by showing that luxuriant crops of all kinds may be reared on the roots of *huckle*-berry, running-brier, and *persimmon*—meaning no *personality* to some of my brethren of the plough and pen, and to say nothing of *sheep-sorrel, et multis aliis*, of the pests which infest our land.

Most gladly would I redeem the annoyance that this long vaunted crop must have cost yourself and readers, by the promise of another equally good on the same field and with the same work; but this can hardly be hoped for in so unpropitious a season. The cold and dry weather retarding vegetation, and, in doing so, favoring the ravages of innumerable worms, insects and birds on the seed and plants of this crop, and thus throwing together the working of *it* with the preparation for and planting of tobacco, as well as other business of a farm, on which, under good management, *each* should have its allotted time, must embarrass exceedingly the *mixed* operations of farming and planting, which belong peculiarly to our middle region.

RIVANNA.

From the Farmer and Gardener.

PATENT BANKING AND DITCHING MACHINE.

We had an opportunity of seeing on Monday, in full operation, a machine for digging ditches, and at the same time making embankments or dikes, which surpasses any thing of which we had formed any conception. The contrivance consists of a wooden foundation of about twelve feet in length, at one extremity of which are two uprights. In these uprights an axle revolves, on which are two arms of cast iron, having at the extremity of each a cross-piece furnished with four or five teeth, as they may be termed. Inside of these cross-pieces are buckets that receive the earth loosened by the teeth, and, as the axis revolves, deposit their contents on an inclined platform, from which the earth passes and forms an embankment on one side of the ditch. The axle is made to revolve by means of cog-wheels connecting it with the gearing. This gearing consists in part of an iron shaft that passes horizontally and a little obliquely in front, and is turned by a capstan. The capstan is provided with a long horizontal arm to which the horse, by which the whole machine is set in motion, is attached. In acting upon this arm the horse walks around the capstan and crosses of course the line of the ditch, but in advance of it. In order to give direction to the machine and prevent it from being drawn aside, there are two guide wheels with sharp edges in the forward portion of the foundation, that cut the sod to the depth of about eight inches. The ditch on which the machine was employed when we saw it, was three feet deep, and three feet and a half wide at the top. It was excavated in an uncommonly hard virgin clay soil, such as is found on the high ground between Fell's Point and the Canton race course.

We were much surprised at the rapidity and perfection with which the excavation was formed, one foot of finished ditch of the breadth and depth mentioned, together with the dike, being formed in a minute, or sixty feet in an hour. It is calculated that a single horse of ordinary strength can propel the machine during ten hours of each day, consequently the extent of trench formed would be six hundred feet. To give an accurate description of this surprising process within the limits of a paragraph, cannot be done, and we must therefore request such as may wish to form a just conception, to witness the performance. In ditching and draining low lands, or dividing prairies where wood is scarce and the soil light or moist, the machine will prove invaluable. The inventor is Mr. George Page, of Keene, N. H. who, as we are informed, undertook to make something answer the purpose at the suggestion of a gentleman at Washington, whose residence is where much draining is required, and but little wood grows. Mr. Edwards, agent for the Sandwich and Boston Glass Company, will furnish any information required.

The above machine has been made for Col. S. D. Wilkens of this city, for the Territory of Wisconsin, in the prairie parts of which it must prove invaluable.

From the Genesee Farmer.

MANUFACTURE OF BEET SUGAR.

The German improvement over the French method of making beet sugar, a patent affair in Europe, consists *simply in drying the beets*, which are then reduced to a powder by grinding, and changed into a decoction by adding water. The experiment has been thoroughly tried by Mr. Zachariah Wilder, of this town, which resulted in *complete success*. Mr. W. by this process, which, we understand, is as simple as that of making a cup of tea from aromatic herbs, has succeeded in extracting *ten per cent. of sugar from the crude beet*—and he is confident that at least *twelve per cent.* can be obtained at another

experiment. For his efforts in prosecuting his experiments to signal success, Mr. Wilder deserves the unqualified thanks of the agricultural world. The result of his labors will give an impetus to the culture of beets in Hampshire county, which cannot fail to be productive of lasting good. But to the process again. The dried powder of the beet was found to yield its saccharine immediately, as the decoction was found to be as sweet as boiled maple sirup, the moment the water was added to the powder. The means used for the clarification of the decoction were very simple. Animal charcoal and lime were the only agents employed. This eminently successful experiment proves the fact, that the immensely important article of sugar can be manufactured by any intelligent farmer's household, as easily as bread, pies or cakes, can be made and baked. A rich garden spot of a quarter of an acre, can produce beets enough to make a thousand pounds of sugar; no heavy capital or incorporated company is required to carry on the business. Every individual can make a pound of sugar as cheaply and as easily as he can make a pound of Indian meal. This important fact has just been proved. Now let us look at the amount of sugar brought into Northampton last year. Why, it amounted to *one hundred and seven thousand pounds*, which, together with molasses consumed, would cost over $10,000. This is no inconsiderable sum to be expended by our citizens annually. A dozen resolute farmers, by their *influence* and labors combined, can create that sum from their lands this summer in the culture of the beet. At least, so we think.

PROGRESS OF THE MANUFACTURE OF POUDRETTE IN THE CITY OF NEW YORK.

To the Editor of the Farmers' Register.

New York, May 14th, 1838.

You have probably noticed in the New York Farmer, that I have been engaged for some time past in introducing an improvement in "*city economy*," by which the contents of privies (an article of great value to agriculture, now thrown away, and *worse* than that, as they are *deposited in the rivers around the city*, instead of being, as I trust hereafter they) are to be converted into an inoffensive and portable manure.

The subject was brought to my attention by a French gentleman who is familiar with the process in his native country, and who is now engaged with me in the operation here. We have had many prejudices to combat, on account of the nature of the business, and many difficulties to encounter, in consequence of the general derangement of business, which have delayed our operations; yet we are now preparing about 60 bushels of poudrette daily, and have a prospect of doing much more after a short time, when other business will have resumed its accustomed activity, so that a few additional shares of our stock may be paid for, which will enable us to increase the number of teams required to "remove the deposites." Of the value of poudrette as a manure, no person of my acquaintance, familiar with its preparation, entertains a doubt; yet there are few persons in this country who are sufficiently acquainted with its use to appreciate duly the benefits which will surely result from the labors of those who shall introduce a mode of preparation by which the immense amount of valuable material, now thrown into our rivers, and of course a *nuisance* to all classes of the community, shall be converted into an inoffensive, portable and highly valuable manure. The process of preparation, in my opinion, does not materially, if at all, deteriorate its value, as I will satisfy you when you will visit our works. That you may be better acquainted with the article, and have an opportunity to test its value, as well as its inoffensive character and portability, I send you a barrel, and shall be much obliged by your using it for any kind of vegetables, or grain, or on grass, as may be convenient for you, and noting its effects as compared with other manures. I cannot give practical instruction as to the best mode of application, but will observe that I am using it in my garden for experimental purposes, by putting some in the hill, some in drills, and spreading some broad-cast and raking it in.

I estimate its strength, or value, in the proportion of one bushel of *poudrette*, to eight or ten bushels of good stable or barn-yard manure, and equal bushel for bushel to bone dust. We have not yet, for want of means to extend our works, been able to furnish a bushel to any person except those who have taken a share or shares of our stock, although numerous applications have been made for it in small and large quantities, as well by gentlemen in neighboring states, as by those in this vicinity. To those who pay in $100, or take a share, we furnish *two hundred* bushels of poudrette as their annual dividend, within *three* and *six months* from the time of payment, which is equivalent to *sixty* per cent. on their investment, as we can receive thirty cents at the works for every bushel we can make.

We hope soon to be able to extend our works largely in order to increase the quantity prepared, so as in some measure to supply the demand for the poudrette.

I am in hopes that important benefits will result from this new source of improvement to agriculture. I say *new* source—it is new in *this* country, at least to much extent. The inquiry is "*how*," and "*how much*," to use—not is it *useful*; as every person, at all conversant with such matters, understands the value of the *raw material*, as well as the difficulty of its application.

I hope to hear from the *effects* of the barrel sent to you.

With much respect, I am very truly yours,

D. K. Minor.

From the Genesee Farmer.

RAISING CLOVER SEED.

In raising clover for seed, in order to procure a good crop, it is first requisite that the land be fertile: that it be well prepared before sowing; and that a sufficient quantity be sown to yield a full and even crop.

The second and most difficult object to attain, is to secure the crop when ripe, so as to save the

largest portion possible of the seed. To do this, it must be cut at a proper season. As the seed ripen at different periods, if the crop is cut too soon, there will be a loss sustained from the immaturity of the seed. If cut too late, those seed first ripe will be liable to be entirely lost by being shattered off in the field. Hence there is a certain medium to be observed, to prevent these two evils, which is, to cut the crop when about two-thirds of the heads have become black; a large portion of the remainder will ripen by the nourishment they obtain from the straw during the drying process. Where the clover is not lodged, it is much the best to cut it with a cradle, laying all of it in double swaths; and securing the heads from falling through the fingers of the cradle by stitching a piece of linen cloth upon them.

After the crop is cut, it must be suffered to remain in the field long enough to become dry; this, if the weather is good, will be in a very few days. It must then, when the dew is upon it, be raked into small bunches, (such as would be a convenient load for a fork,) and when sufficiently dry, placed carefully upon a sled or wagon, and drawn into the barn. If the weather is unfavorable, it becomes necessary to turn these bunches repeatedly, to prevent their being injured by the moisture. Indeed, this should be done even in fair weather, if they remain out longer than two or three days. When drawn into the barn, the crop may be either stowed away in mows, or else thrashed out immediately, and the heads and chaff placed in a room for the purpose, for ultimate cleaning. This may most generally be done best in winter.

If farmers could always raise their own seed, and in sufficient abundance, it would be much better to sow it in the chaff, as it is generally found to be more certain to grow. The only advantages of cleaning are, the more exact determination of the *quantity* to be sown, and the more equal distribution of the seed; and where it is raised for sale cleaning is of course requisite. When sown in chaff, the difficulty with regard to quantity and distribution may be obviated by sowing sufficient to insure the desired thickness on every part of the ground.

By far the best method of cleaning is by means of a machine; but as this is not always to be had, the practice of treading it out by horses is then to be resorted to, though it is tedious and unpleasant. It is thus performed. The barn floor is covered with chaff about a foot in thickness, and the horses are driven upon it one day. The next morning it is to be passed through a fanning mill, and the chaff and dust which has been beaten off will be blown away; the clean seed will pass through the screen; while a third and larger portion, containing the seed yet in the chaff, will drop in the rear of the fanning mill. This is to be spread a second time upon the floor, mixed with a fresh portion of unseparated chaff, and again trodden by the horses; the second morning repeat the same operation, and a much larger portion of clean seed will be obtained. The operation is thus to be repeated until the whole of the chaff is separated.

In order to clean the seed properly for market, it is necessary first to run it through a sieve of just such a degree of fineness as to permit the clover seed to pass through, but retain all large substances. It must then be passed through a sieve just fine enough to retain the clover seed, but to suffer all smaller seeds to pass through. In this way it is effectually cleaned.

By proper attention and care, three or four bushels may be easily obtained from an acre of land.

J. J. T.

THE ADVANTAGE OF USING SUB-CARBONATE OF SODA IN WASHING CLOTHES.

[The following short article was before published in the Farmers' Register, nearly three years ago; and the since well-tested value of the practice induces us, contrary to our usage, to re-insert the directions, for the benefit of the many later subscribers, as well as the many older ones, who passed over the former publication without notice. The saving of labor by using this plan, is thought to be so great by some of the ladies of our acquaintance, that if nothing else had been gained by their husbands from the Farmers' Register, they think that for this little article alone they might well afford to pay a subscription for life.

As it may not always be convenient, in country places, to obtain lime-water, cheap as it is, it is proper to say that that ingredient may be omitted without sensible injury to the process. The sub-carbonate of soda is now getting into extreme use for this purpose, and may be bought at any apothecary's shop, at 12½ cents the pound.—Ed. Far. Reg.

[From the Essex North Register.]

In this day of improvements, few have been suggested of more importance, especially to females, than the new mode of washing clothes, which has been introduced into this town [Newburyport] through the agency of two benevolent individuals, now residing at a distance from us. It has been tried by quite a number of females with complete success, and those who have tried it are desirous of communicating it extensively, that others may reap the same benefit which has accrued to them. It is to be used only for white clothes. It does not answer the purpose in case of calicoes and woollens.

1. *Mixture*—Five gallons soft water, add half a gallon of lime water, a pint and a half of soft soap, or a pound of hard soap, and two ounces of carbonate of soda.

2. *Method of washing*—Soak the clothes over night if very dirty, at any rate wet them thoroughly before putting them into the mixture. When the above mixture is at *boiling heat*, put in the clothes that have been soaked or wet, merely rubbing those parts with a little soap that are unusually soiled. Boil them *one hour*. They are then to be taken out and drained, and thoroughly rinsed in warm water, then in the indigo water as usual, and they are fit for drying. The lime water may be prepared and kept on hand—the soda, sub-carbonate, (be sure to get the right kind) may be procured cheap, by purchasing it in a large quantity. Let all who feel that washing day is a day of hard work and weariness, cease to complain, until they are willing to try this safe, easy and expeditious mode of lightening their burdens.

From the Franklin Farmer.

BLUE GRASS.

This grass, which constitutes the glory of Kentucky pastures, is esteemed superior to all others for grazing. It flourishes only on calcareous soils. Opinions and practice vary here, as to the best time of sowing it—some preferring September, for the same reasons, chiefly, which relate to timothy or other grasses, others preferring February or March, to obviate the danger of the tender roots being winter killed. It is sown either on woodland or open ground—in the latter case most generally after a succession of exhausting crops in old fields. If sown on woodland, the leaves, brush and trash must be raked off or burnt. It is particularly important to burn the leaves, else the seed may be blown away with them by the wind, or if not blown away, the leaves may prevent the seed reaching the earth and thus defeat their germination. Many of those who sow in winter, prefer casting the seed on the snow, as it enables them to effect the operation with more neatness and uniformity. In woodlands, the grass must not be grazed the first year, or at all events till after the seeds have matured. In open land, the practice has been adopted by some, of mixing timothy and clover with blue grass, in which case, half a bushel of the latter seed to the acre, is sufficient. The advantage resulting from this is, that it secures at once, a well covered pasture that will bear considerable grazing the first year. The blue grass, in a few years, expels the other grasses, and takes entire possession of the field. On open ground, it is frequently sown in March upon wheat, rye or oats. If the season is favorable, it may be sown in April; but should the weather prove dry, a great portion of the seed will be lost. It is the practice, we believe, of most graziers, to put upon a given pasture, as much stock as it will maintain, without shifting them during the season, as, besides saving labor, it renders the cattle more quiet and contented. Others, however, fence off their pastures into separate divisions, to undergo a regular succession of periodical grazings. This plan secures a constant supply of fresh grass, very grateful to the animals, and is believed to be more economical, as much less is trampled and rejected by the cattle. The number of animals to the acre, must depend upon their size and the quality and quantity of grass. The grass on open ground is much more abundant, sweet and nutritious, than on woodland, and consequently will maintain much more stock, perhaps nearly twice as much; while open woodland will produce much more and better grass than that which is deeply shaded. The best graziers extirpate, as fast as possible, every tree not valuable for timber or wanted for fuel, and some even prune the branches of those which are allowed to remain. But we shall soon, we hope, be able to present this subject more at large, in some numbers which are preparing, on the grazing and stock-feeding systems of Kentucky, which we trust will prove interesting to all our readers and particularly instructive to the farmers in the southern portion of the state and Tennessee. Although we wish well to the tobacco growers on Green river, and would cheerfully lend our aid to promote their particular interests in that pursuit, we wish they could be persuaded to adopt, in its stead, the grazing business; for we are confident it is a much more productive, and certainly a more agreeable and less laborious one.

From the Genesee Farmer.

BEST TIMBER FOR PUMP LOGS.

Friend Tucker—It may be thought too aspiring by some, for an old man of 82 years of age, to begin to write for newspaper inquiries; but seeing some inquiries and communications in several of the numbers of this year's Genesee Farmer, respecting the best method of conducting water in logs to the place desired, I would inform friend Southhill, as I have had some experience in conducting the water to my house from a distance, near forty years, in logs, of the sort of timber I used, and the manner of laying the logs, in as concise a manner as I can, and the length of time they have been in operation, from actual experience. The timbers used were all poplar (or what is called the tulip tree), except three logs, two of which were white oak, the other of chestnut—all green, with the bark on, of the size of from one foot to fifteen inches in the but-end, and not less than eight inches in the top-end. They were bored with an augur of two and a quarter inches, and put together similar to a pump, but without any iron bands. They were put in a trench three feet deep, in the year 1797, the 8th month. They answered every purpose I could expect, until 1830, at which time some of the joints began to leak. In the year 1835, I had them taken up, as they were not likely to convey a sufficient quantity of water. The distance from the spring-house to the head of the spring, was 33 poles, and the descent three feet. The end of the pipe in the spring-house was 18 inches higher than the rest, until within three or four poles of the spring-head, for the purpose of keeping the air out, to prevent it from rotting. The logs were from fifteen to twenty-eight feet long. When taken up, it appeared that the deficiency was at the joints, the hole being worn to the size of four, and some five inches, which originally was but two and a quarter inches. A number of the joints were worn entirely through, the small end having been tapered to join them together. I had the pipes laid the second time, with timber similar to the first, one half new logs, the other half were of the best and largest of the old logs that had been in 38 years, and appeared to be in good condition.

I had them laid in a different manner. All the logs were cut square at the ends, and were joined together by a band or ring of iron from seven to eight inches in the clear, three inches broad and one-eighth thick, sharpened at both edges and drove in between the ends of the logs so as to leave an opening between of half an inch, which was filled with slacked lime before covering, to prevent the iron from rust. In order to have the bands extend equally in both logs, I had a chisel made the same circle of the bands, three inches wide, and drove in each end of the log one inch, previous to putting them together. There has not been the least appearance of any deficiency at this time.

A Pennsylvania Farmer.

Wood Lawn, 4th mo. 10th, 1838.

From the Genesee Farmer.

BARLEY.

The increasing attention which is paid to the culture of barley—the profits of the crop—its value as a preparative for wheat—and the favor which it finds as a substitute for wheat in making bread, are entitling it to a high rank among the grains cultivated in this country.

According to Loudon, there are six species and sub-species of this grain in cultivation, besides varieties.

Hordeum vulgare, or spring barley, is distinguished by its double row of beards or awns, standing erect, and its thin husk, which renders it favorable for malting. This is the sort commonly grown in the southern and eastern districts of both England and Scotland.

Hordeum cæleste, or Siberian barley, is a variety of early or spring barley, much grown in the north of Europe, having broader leaves, and reckoned more productive than the other.

Hordeum hexastichon, winter barley, or as it is called in Scotland, square barley, is a variety known by having six rows of grains, large and thick-skinned, and for that reason not considered as favorable for malting.

Barley bigg, is a variety of winter barley, known by its always having six rows of grains, by the grains being small and thick-skinned, and being earlier than the preceding or parent variety. It is hardy, and chiefly grown in Scotland.

Hordeum distichon, common, or long-eared barley, is known by its long spike or ear flatted transversely, and its long awns. It yields well, though some object to it, because the ears being long and heavy, they think it apt to lodge.

Hordeum distichon nudum, or naked barley, is known by the awns falling easily, and when ripe, almost of themselves from the chaff, when the ear somewhat resembles wheat, and by some is called wheat barley. It is spoken highly of in the British Husbandry, as being hardy in growth, strong in the stem, tillering with great vigor, and producing abundant crops of fine grain. By some, this variety is considered the same as spelt wheat, which indeed it strongly resembles. It is six rowed.

Hordeum zeocriton, sprat or battledore barley, is known by its low stature, coarse straw, short broad ears, and long awns. It is but little cultivated.

New varieties of barley are produced in the same manner as in wheat, by crossing, and some of the most celebrated kinds, such as the chevalier, annat, &c. have originated in this way.

In this country but two varieties are sown, and these are familiarly distinguished as the two and the six-rowed. They are always sown in the spring; no kind in the United States being able to endure the severity of our winters, or at least we know of no variety which has been attempted here as a winter or fall-sown grain. The comparative value of the two varieties does not seem to have been fully decided by our farmers, some preferring one kind and some the other. That the two-rowed will make the most flour from a given number of pounds—that its thin skin renders it more suitable for malting—and that it is rather less liable to be affected by smut than the six-rowed, seems to be generally conceded; but its productiveness is much disputed, and it would seem with some reason, as the greater length of the ear in the two-rowed, would hardly compensate for the greater number of rows in the other variety. So far as we are able to judge, however, from the opinions of experienced farmers, the preference, for the reasons assigned, is becoming more decided in favor of the two-rowed.

Barley of every variety requires a rich, friable and mellow soil, which retains a moderate quantity of moisture, but without approaching to that which may be denominated wet; as for instance, land which contains from 50 to 65 per cent. of sand, and the remainder chiefly clay, though in situations where the climate is usually moist during the summer, it may be grown where sand is in the soil in a larger proportion. It succeeds best in what farmers term a rich deep loam, and with too much sand, or too much clay, will not produce good crops. With the single exception, that it will succeed with less lime than wheat, soils that will produce good wheat, will also grow barley to advantage.

It is probable that more barley is grown in the state of New York than in all the rest of the United States, and the section in which it is produced in the greatest abundance and perfection. is the northern slope of western New York. The ranges of towns which mark the geological separation of the argillaceous and limestone districts, have hitherto yielded the greatest quantities of barley, and in them the culture is still rapidly extending. On this slope, it is found that soils on which winter wheat without extra care in cultivation, is very liable to freeze out in the spring, will produce heavy crops of barley, and hence clover and barley on many farms have taken the place of clover and wheat, affording about the same profit in the crop and at a less expense of labor. This is particularly the case in the country reaching from the Oneida to the Canandaigua lakes, including a part of Madison, Onondaga, Cayuga, Seneca, Yates and Ontario counties. On what is called the great limestone region of west New York, wheat will undoubtedly be preferred to barley as an article of culture; and it may be remarked as a general rule, that on all soils where good barley can be grown, the suitable application of lime will ensure the success of wheat.

Perhaps there is no crop which demands and repays thorough working of the soil better than barley. The surface when fitted for the reception of the seed, can hardly be made too fine; and the excellence of the crop is greatly dependent on this point. A crop that occupies the ground so short a time as barley, spring wheat or oats, can hardly be benefited by manure applied directly to them, unless in a thoroughly decomposed state; and hence it has been found by experience, that these crops succeed better after hoed or root crops to which the manure has been applied, or on turf lands that have received a top-dressing of manure, and been carefully turned over in the fall of the year. The practice, somewhat extensively followed, of sowing winter wheat after barley, has led to the application of the manure to the barley crop; and perhaps where hoed crops cannot precede, this is the preferable way, though there is a great risk of too much straw, and the consequent lodging of the barley before ripening.

Barley should be sown in all cases, as soon as

the ground is sufficiently dried and warmed to allow the seeds to germinate freely, and place them beyond the danger of injury from frost. Early frosts are more fatal to barley than to spring wheat or oats, and more injurious on wet or low lands than on dry or elevated ones. Particular attention must be paid to the dryness of the soil at the time of sowing, especially if naturally inclining to wet, as on such soils a wet spring will starve and destroy the plants. "Steeping the seed for twenfour hours in soft water, will cause the grain to germinate at the same time; and this, if it is sown at a late period, is of more importance than may be generally imagined, as it is otherwise apt to ripen unequally." (Brit. Hus.) The finest, heaviest samples of all grains are usually obtained from early sown fields; and the difference in weight in barley and oats, is from one-fifth to one-third in favor of early sowing. The smut is the only disease to which barley is subject, and this is rarely a serious injury, where the crop is grown on favorable soils, or the seed is put in in good order. The worm which has proved so destructive to wheat in the eastern counties, has also injured the barley in a considerable degree; but in west New York, we have neither seen nor heard of its appearance in this grain. The wire-worm is sometimes very destructive to the crop when young; and in some seasons, the meadow mole, so called, when the grain approaches maturity, makes sad havoc by cutting down the plant to get at the ears; an effect more often observed when the barley is sown on turf leys, as they will rarely lie so close as not to leave numberless hiding-places to the animal.

In sowing barley, as in most other crops, the universal experience of English farmers, and the directions of the best works on agriculture, go to establish the fact, that less seed is required on rich lands than on poor, and that the quantity of seed used should be increased in proportion to the lateness of the sowing. In European countries, from ten to eighteen pecks per acre is used; sixteen being the quantity usually recommended; in this country from two to three bushels is considered sufficient for the acre. The two-rowed requires less than the six-rowed, as it tillers more vigorously; and if sown too thick, the plants will be weak and ripen irregularly.

Both the quantity and quality of the product depend on the soil, and the variety of the grain sown. In this country, the average crop may be stated from thirty to thirty-five bushels per acre; in England, the average produce is estimated at thirty-two bushels. Middleton says, the crop in that country varies from fifteen to seventy-five bushels an acre. The greatest crop we have seen mentioned in this country was sixty-five bushels per acre, and that was grown on land from which several crops had been taken in succession. In an experiment made by the East Lothian Agricultural Society upon the chevalier, and a common sort of barley, both sown on a light gravelly soil, the produce of each per imperial acre, was—chevalier, 65 bushels 2 pecks of grain, weighing 56¾ lbs. per bushel. Common barley gave 61 bushels 2 pecks of grain, and weighed 54¾ lbs. per bushel.

Good qualities of the two-rowed, will average about 52 or 53 lbs. per bushel; but the winter, or six-rowed varieties, will not exceed 43 to 46 lbs. The difference in malting is great; the experiments of Dr. Smith, showing that a Winchester quarter of the several varieties, when malted, would produce the following quantities of proof spirits, viz:

English barley about 21¼ gallons,
Scotch barley " 19¼ "
Scotch bigg " 16¼ "

Or that English barley was 11 per cent. superior to Scotch, and full 12 per cent. above Scotch bigg, or winter barley.

The value of the several kinds of grain as an article of food, may be estimated from the following table; the quality of the flour being good household or family flour.

Wheat, if weighing	60 lbs. of flour	48 lbs. of bread	64 lbs.
Rye,	54	42	56
Barley,	48	37½	50
Oats,	40	22½	30

(Brit. Hus.)

The analysis of barley by Sir H. Davy, gives as contained in 100 parts:

79 per cent. of mucilage or starch,
7 of saccharine matter,
6 of gluten or albumen.

Owing to the deficiency of this latter substance, or gluten, barley flour, like that of oats, buckwheat or potatoes, cannot be made into bread alone, but is mxied with wheat flour, or eaten in the form of cakes, when it is very wholesome and palatable.

Barley is perhaps one of the most difficult of the grains to secure in good condition; as, if suffered to stand until the berry is perfectly dry and hard, the head will frequently drop down, owing to the brittleness of the straw; and if cut too early, the grain will shrink and lose in weight; and as it cannot when cut in an unripe state be put into barns or stacks without certain injury by heating, so in unfavorable weather it is very apt to become of a black color, and lose the clear yellowish-white tinge so characteristic of good and well-cured barley. The usually fine state of our atmosphere, and the clear dry air of our summers, render the proper curing of barley a much less difficult task here, than in the moist climate and cloudy skies of Great Britain.

Before the introduction of threshing machines, barley, though easily threshed by horses or by hand, was with great difficulty prepared for market, owing to the obstacles offered in separating the awn from the kernel; and at the present time in many districts of England, and most parts of the continent, the *hummeling*, or freeing the berry from the beard, is one of the most laborious and difficult processes in the culture of barley.

Barley is extensively used in the fattening of pork, for which purpose it is admirably adapted when prepared by steaming or grinding; and in the districts where it is grown, is an excellent substitute for the corn crop, which for a few years past has been a partial failure. It is also used in large quantities in our breweries, and in too many instances takes the place of rye in the manufacture of whiskey. As a feed for horses it is not generally approved, but for fattening cattle, hogs and poultry, it is highly prized. Before the system of cutting straw, or manger-feeding was generally

adopted in Great Britain, barley straw, owing perhaps to its being cut early, was used as food for cattle in preference to others, as cattle could eat it uncut more readily than the harder straws. Wheat or oat straw is now preferred when it is to be converted into chaff, or cut fine for mixing with hay or roots. There are varieties of barley found in the shops, pearl and Scotch, both of which are prepared by divesting the kernel of its husk in mills, resembling in some degree the rice-mills of the south; and in the case of the pearl barley, the grinding or rubbing is continued until the berry assumes a smooth round form. Few articles are more nutritious, or better adapted to the stomachs of the weak or the valetudinarian.

From the London and Edinburgh Philosophical Magazine.

ON THE FORMATION OF MOULD.

By Charles Darwin, Esq., F. G. S.

The author commenced by remarking on two of the most striking characters by which the superficial layer of earth, or, as it is commonly called, vegetable mould, is distinguished. These are its nearly homogeneous nature, although overlying different kinds of subsoil, and the uniform fineness of its particles. The latter fact may be well observed in any gravelly country, where, although in a ploughed field, a large proportion of the soil consists of small stones, yet in old pasture-land not a single pebble will be found within some inches of the surface. The author's attention was called to this subject by Mr. Wedgwood, of Maer Hall, in Staffordshire, who showed him several fields, some of which, a few years before, had been covered with lime, and others with burnt marl and cinders. These substances, in every case, are now buried to the depth of some inches beneath the turf. Three fields were examined with care. The first consisted of good pasture land, which had been limed, without having been ploughed, about twelve years and a half before: the turf was about half an inch thick; and two inches and a half beneath it was a layer, or row, of small aggregated lumps of the lime, forming, at an equal depth, a well-marked white line. The soil beneath this was of a gravelly nature, and differed very considerably from the mould nearer the surface. About three years since cinders were likewise spread on this field. These are now buried at the depth of one inch, forming a line of black spots parallel to, and above, the white layer of lime. Some other cinders, which had been scattered in another part of the same field, were either still lying on the surface, or entangled in the roots of the grass. The second field examined was remarkable only from the cinders being now buried in a layer, nearly an inch thick, three inches beneath the surface. This layer was in parts so continuous, that the superficial mould was only attached to the sub-soil of red clay by the longer roots of the grass.

The history of the third field is more complete. Previously to fifteen years since it was waste land; but at that time it was drained, harrowed, ploughed, and well covered with burnt marl and cinders. It has not since been disturbed, and now supports a tolerably good pasture. The section here was, turf half an inch, mould two inches and a half, a layer one and a half inch thick, composed of fragments of burnt marl (conspicuous from their bright red color, and some of considerable size, namely, one inch, by a half broad, and a quarter thick,) of cinders, and a few quartz pebbles mingled with earth; lastly, about four inches and a half beneath the surface was the original, black, peaty soil. Thus beneath a layer (nearly four inches thick) of fine particles of earth, mixed with some vegetable matter, those substances now occurred, which, fifteen years before, had been spread on the *surface*. Mr. Darwin stated that the appearance in all cases was as if the fragments had, as the farmers believe, worked themselves down. It does not, however, appear at all possible, that either the powdered lime or the fragments of burnt marl and the pebbles could sink through compact earth to some inches beneath the surface and still remain in a continuous layer. Nor is it probable that the decay of the grass, although adding to the surface some of the constituent parts of the mould, should separate, in so short a time, the fine from the coarse earth, and accumulate the former on those objects which so lately were strewed on the surface. Mr. Darwin also remarked, that near towns, in fields which did not appear to have been ploughed, he had often been surprised by finding pieces of pottery and bones some inches below the turf. In a similar manner on the mountains of Chili he had been perplexed by noticing elevated marine shells, covered by earth, in situations where rain could not have washed it on them.

The explanation of these circumstances, which occurred to Mr. Wedgwood, although it may, at first, appear trivial, the author did not doubt is the correct one, namely, that the whole is due to the digestive process, by which the common earth-worm is supported. On carefully examining between the blades of grass in the fields above described, the author found, that there was scarcely a space of two inches square without a little heap of the cylindrical castings of worms. It is well known that worms swallow earthy matter, and that having separated the serviceable portion, they eject, at the mouth of their burrows, the remainder in little intestine-shaped heaps. The worm is unable to swallow coarse particles, and as it would naturally avoid pure lime, the fine earth lying beneath either the cinders and burnt marl, or the powdered lime, would, by a slow process, be removed, and thrown up to the surface. This supposition is not imaginary, for in the field in which cinders had been spread out only half a year before, Mr. Darwin actually saw the castings of the worms heaped on the smaller fragments. Nor is the agency so trivial as it, at first, might be thought; the great number of earth-worms (as every one must be aware, who has ever dug in a grass-field) making up for the insignificant quantity of work each performs.

On the above hypothesis, the great advantage of old pasture land, which farmers are always particularly averse from breaking up, is explained; for the worms must require a considerable length of time to prepare a thick stratum of mould, by thoroughly mingling the original constituent parts of the soil, as well as the manures added by man. In the peaty field, in fifteen years, about three inches and a half had been well digested. It is

probable however, that the process is continued, though at a slow rate, to a much greater depth; for as often as a worm is compelled by dry weather, or any other cause, to descend deep, it must bring to the surface, when it empties the contents of its body, a few particles of earth. The author observed, that the digestive process of animals is a geological power which acts in another sphere on a greater scale. In recent coral formations, the quantity of stone converted into the most impalpable mud, by the excavation of boring shells and of nereidous animals, is very great. Numerous large fishes (of the genus *Sparus*) likewise subsist by browsing on the living branches of coral. Mr. Darwin believes, that a large portion of the chalk of Europe was produced from coral, by the digestive action of marine animals, in the same manner as mould has been prepared by the earth-worm on disintegrated rock. The author concluded by remarking, that it is probable that every particle of earth in old pasture land has passed through the intestines of worms, and hence, that in some senses, the term "animal mould" would be more appropriate than "vegetable mould." The agriculturist in ploughing the ground follows a method strictly natural; and he only imitates in a rude manner, without being able either to bury the pebbles or to sift the fine from the coarse soil, the work which nature is daily performing by the agency of the earth-worm.*

DISEASE AMONG THE SHELL-FISH.

"One of the most curious phenomena of the year (1836) has been the fatal effect of an epidemic disease among the molluscous animals or shell-fish of the Muskingum river, (Ohio.) It commenced in April and continued until June, destroying millions of that quiet, retiring race, which people the beds of streams. As the animal died, the valves of the shell opened, and, decomposition commencing, the muscular adhesions gave way, and the fleshy portion rose to the surface of the water, leaving the shell in the bed of the stream. As these dead bodies floated down the current, the heads of islands, masses of fixed drift-wood, and the shores in many places, were covered with them, tainting the air in the vicinity with putrid effluvia. The cause of the disease amongst the shelly race, remains as much a mystery as that of the Asiatic cholera amongst the human family."—*Dr. S. P. Hildreth, Journal of Science.*

From the Genesee Farmer.

GERMINATION OF THE ACACIA OR LOCUST SEED.

Mr. Loudon, in his Magazine of Natural History, states that Sir John Herschel lately sent some seeds of the acacia from the Cape of Good Hope, with directions to scald them to ensure their growth. Mr. L. having received some of them, subjected them to the following experiments:—two were placed in boiling water, and left to soak for an hour, until the water had become cool; two were kept at the boiling temperature for one and a half minutes. Some were sown immediately under a hand-glass in the open border; and the rest were kept for three or four days and then sown in a hotbed. The following are the results:—

Under the hand-glass.

1 boiled 1½ minutes failed.
1 do. 3 do. came up in 14 days.
1 do. 6 " " " 13 "
1 not steeped at all did not germinate.

In the hotbed.

1 boiled 1½ minutes came up in 8 days.
1 " 3 " " 7 "
1 " 6 " " 7 "
1 " 15 " " 13 "
2 in boiling water left to cool 9 "
2 not steeped came up in 21 "

Nothing can more forcibly show the hardness of the envelopes, or the tenacity of life in the acacia, than the germination of the seed after boiling 15 minutes. We have a number of times scalded the locust seed to produce germination, no other mode being so speedy or effectual.

From the Southern Agriculturist.

SUN-FLOWER CULTURE.

Effingham County, Geo. Feb. 10, 1838.

Mr. Editor,—In your last September number, I saw a communication relative to the sun-flower, and as you seem willing to "gather up the fragments, that nothing be lost," I take the liberty of saying, that I have been in the habit of planting the sun-flower a number of years, to a limited extent.

There are several fences, which lead from my yard fence, to the surrounding woods—the weeds and grass growing up in the fence corners, formed ready ways for snakes to visit the yard. To prevent this, the hoe is used to keep these ways clean, and so prevent the temptation to their visits.

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* Since the paper was read, Mr. Darwin has received from Staffordshire the two following statements:—1. In the spring of 1835 a boggy field was so thickly covered with sand that the surface appeared of a red color; but the sand is now overlaid by three-quarters of an inch of soil. 2. About eighty years ago a field was manured with marl; and it has been since ploughed, but it is not known at what exact period. An imperfect layer of the marl now exists at a depth, very carefully measured from the surface, of twelve inches in some places, and fourteen in others, the difference corresponding to the top and hollows of the ridges or butts. It is certain that the marl was buried before the field was ploughed, because the fragments are not scattered through the soil, but constitute a layer, which is horizontal, and therefore not parallel to the undulations of the ploughed surface. No plough, moreover, could reach the marl in its present position, as the furrows in this neighborhood are never more than eight inches in depth. In the above paper it is shown, that three inches and a half of mould had been accumulated in fifteen years; and in this case, within eighty years (that is, on the supposition, rendered probable from the agricultural state of this part of the country, that the field had never before been marled) the earth-worms have covered the marl with a bed of earth averaging thirteen inches in thickness.

Now, while all this operation is going on, I have two hills of sun-flowers growing in every fence corner; two stocks (or say three or four) in a hill, planted early in the spring. About the time that my long forage gives out, these begin to bloom. As the blossoms begin to appear, I cut them off about a foot from the ground, and give to my horses, which eat them very readily,—leaves, buds, stocks, and all. This I consider a very wholesome, as well as nutritious food. Thus the ground that has to be kept clean, to prevent unwelcome visiters, is made in the mean time to yield profitably.

If, in your judgment, you think proper to introduce this scrap to the company of your more useful communications, it is at your service.

A Small Goshen Farmer.

REMARKS ON, AND SOME OBJECTIONS TO, THE ESSAY ON "AGRICULTURAL HOBBIES AND HUMBUGS."

To the Editor of the Farmers' Register.

May 15*th*, 1838.

I have been so much amused with your article on agricultural hobbies and humbugs, (p. 47, vol. VI.) and think most of your remarks so perfectly just, that I could hardly prevail on myself to express my dissent from such as I cannot concur in: nor would I do it, but for your often-avowed desire to have all your opinions freely canvassed, where any good to our cause might possibly result from it, in the opinion of those who may differ from you. I have very rarely been among that number; and where I have, it has been, in each case, with much distrust of my own opinion, and not a little fear, that my readers might so far mistake the motives of my communications, as to ascribe them, rather to the silly vanity of seeing myself in print, than to their real cause—which has ever been, the hope of promoting, in some degree, the great object of your paper. With this anchor thrown out to windward, I shall commence my objections.

The first is—for your apparent preference to corn with the largest cobs, of which you say, it "is evidently and mathematically true, if the grains are of equal size, there will be more encircling a *large* than a *small* cob." Now to me it appears "evidently and mathematically true," that this depends upon the grains being of equal *width*, and *not* on their equality of size; for a *broad* grain may be of equal size with a *long* one, although the latter will certainly out-number the former, although the length and diameter of their respective cobs be precisely the same. Again, it "is evidently and mathematically true," that although *one large single ear* with a *large* cob, will have more grain than any *single ear* with a *small* cob; yet, if the small cob variety produces several more ears, under similar circumstances, on a single stalk, of which there are many unquestionable proofs, in regard to the twin-corn, than the large-cob varieties, the former will, with mathematical certainty, produce the most grain. In the case of the twin-corn, fairly and accurately compared with two other very popular varieties, both having very large cobs, I have ascertained by actual measurement, the difference in favor of the twin-corn was as nine to seven.

Your second opinion from which I dissent, is that wherein you say, that "you have no faith either in the reasonings or the supposed results of choosing seed-wheat," either for the large size of the grain, the large number of grains in the head, or the large number of stalks and quantity of grain from a single seed. This seems tantamount to a belief, that the only circumstance worthy of attention in the choice of seed-wheat, or indeed of any other seed, is, to be sure it will vegetate. In other words, that none are susceptible of any improvement worth regarding, merely by selecting that which appears to possess most of those qualities almost universally believed to be essential to the perfection of all seed. I say almost universal, for I do not recollect ever to have met with but one person who entertained the opinion I understand you to express on this highly interesting subject. Possibly, however, I may misunderstand you; and since nothing is farther from my wishes, let me repeat what you seem to me to have said. First, in regard to seed-wheat, that you disbelieve the common notion, that more product can be secured from the land by choosing seed, either for its size, the large number of grains in the head, or the large number of stalks and quantity of grain from a single seed. Secondly, in regard to seed-corn, or any other seed, I understand you to say, that you have not the slightest faith, "that larger crops can be obtained by choosing seed on account of *the form, size, or number of grains, or the size or number of ears, &c.*" Now this "*et cætera*," I must presume, comprehends all the other qualities usually attributed to, and sought after in seed; in all which, you say, that "*you have not the slightest faith.*" But if none of them are worth regarding, does it not follow, undeniably, that the sole ground of preference left is, that *one* sample will vegetate better than *another?* It is true that you qualify, in some degree, your sweeping anathema against the common creed and practice, by saying—you do not deny—that particular varieties of plants *may be somewhat more productive* than others which are equally suitable to the same soil and climate; yet this is but cold encouragement, and is a very different thing from admitting the fact. Indeed, it seems nearly the same as declaring that you do not fully believe it; although you give us the result of no experiments made by yourself or others to confirm this strongly-implied scepticism. You have classed both the creed and the practice which you condemn, among "*hobbies and humbugs;*" and there is nothing of which your "good-enough" farmers, (by far the most numerous class among us,) have such a mortal dread, as the ridicule attached to hobby-riding.

In another place, speaking of varieties of corn, your infidelity as to their relative productiveness, is not left to implication, for you positively avow that "your views are utterly opposed to the belief, that either the Maryland twin-corn, the Baden-corn, or the Dutton-corn, are more productive in a very great degree, than other varieties in *any* situation;" although it does not appear that you yourself have ever made, even a single comparative trial, to ascertain whether the opinion be true or false. Now, if you admit a difference of somewhat more than 15 per cent., to constitute a very

great degree, as most corn-makers would probably deem it, your own paper, I think, has furnished a sufficient number of facts (unless you discredit them,) to conquer your incredulity—at least, as to the twin-corn; for several of your correspondents have stated to you something much more credible than mere "*supposed results.*" But the utmost difference in productiveness you seem willing to admit possible, either between varieties of corn, or of any other plants, is marked by the very qualified and discouraging expression, "*somewhat more productive.*" This indicates so little difference, that were the opinion to become general, it would very soon, I think, effectually prevent all trials whatever between varieties of plants, unless made for some other purpose than to ascertain which would produce most.

In commenting upon Mr. Carmichael's opinion, that more than 15 per cent. difference may be expected from twin-corn in fertile land, you remark, that "this amount of increase, if actually ascertained, is sufficiently great to induce the trial of this corn, on soils recommended as suitable, and in a latitude not very different from that of Queen Ann's county, Md. But this increase is far short of what the sanguine expect; and the writer entirely objects to planting it on any but the very small portion of *rich lands.*" Now, I do not thus understand him; for his words, as you give them, are—"my experience induces me to think, that no great advantage is derived if this corn is planted on lands naturally poor, or exhausted by cultivation." This certainly admits *some advantage*, even on such lands, and is very different from an entire objection; although to plant any one thing in preference to another, in a naturally poor or exhausted soil, would hardly be deemed of much advantage by any one who had ever tried, even without Mr. Carmichael's caution. What "the sanguine may expect" from cultivating the twin-corn, I have no means of knowing; but I can very confidently assert, that there is no authority, either in print or manuscript—at least none that I have ever seen or heard of—to justify them in expecting much, if any more, than Mr. Carmichael has stated.

In the first part of your remark just quoted, you speak of "*latitude,*" as the chief circumstance to be regarded in choosing among the varieties of corn; and in a few lines below you add: "This corn is a *forward* kind, even in Maryland—of course, it is too forward for our location." Of its forwardness, I can assert, from three years' trial, that the difference in comparison with our common corn, does not exceed ten or twelve days; and in regard to your conclusion, that it is "too forward for our location," I must call it a *non sequitur;* at least, if the opinion of Monsieur de Candolle, one of the greatest botanists who ever lived, be correct. This gentleman spent six entire years in prosecuting, through the different departments of France, such investigations as were calculated to determine, with all attainable precision, the general laws by which the geography of plants is regulated. The very numerous facts collected by him during this highly interesting research, proved conclusively, *that although temperature, arising from climate or elevation, light, moisture and aspect, exercise each a considerable influence over the growth and productiveness of vegetables, the distribution of heat,* in the different seasons of the year, *has more power than any other cause whatever.* Now, here is an opinion opposed to yours, and founded on a multitude of facts which the author was six whole years in collecting—confirmed, too, by the general fact known to us all, that in European latitudes corresponding with ours, many plants grow in the open air, which here require the protection of green-houses for more than half the year. On the other hand, your opinion as to the effect of much less than two degrees difference of latitude, (for the middle of Virginia is in 38°, the middle of Maryland in 39°,) is unsustained by any facts or experiments whatever—at least you mention none. But as a farther proof that the twin-corn is *not too forward* for our location, I have authentic information from several gentlemen residing in different and distant parts of our state, (one as far south as Mecklenburg,) who speak very favorably of this corn in comparison with all the other varieties which they have heretofore tried. The only gainsayer whom I have seen in print, is your correspondent, Mr. Andrew Nicol, who has gone so far as to say —"*the bread made from it appears to me less sweet, also drier and harsher to the taste, than that made from our common corn;*" and this, too, in addition to condemning it as less productive than the common corn of his neighborhood. Upon this anathema against twin-corn bread, it has been remarked, that "Mr. Nicol's mouth must have got most marvellously out of taste, when he uttered this sentence." But I, who have always maintained both the truth and justice of the old adage, "*de gustibus nil disputandum,*" have insisted on his right to avow any taste he pleases, notwithstanding, in this case, it is unique, and directly opposed to that of some hundreds of persons, who have declared that twin-corn made the best and sweetest bread they ever ate.

Having at last reached a kind of resting-place in my voluntary and unsolicited labors, I have deemed it best to look back before I proceed farther. This retrospect has elicited a "thinks I to myself," how friend Ruffin and my other readers, (should I get any,) chuckle and exclaim—"what a self-comforting side our friend J. M. G. has given himself on his twin-corn hobby, flattering himself all the while, credulous soul! that he is edifying *us*, rather than gratifying his *own passion* for prosing, in which he indulges somewhat too freely, although we are willing to allow him good motives." I have a strong presentiment that some such reflections will certainly be made, although they may not possibly find utterance in words. Yet, notwithstanding I may increase the risk of exciting a laugh against myself, I must add a few more words in explanation of what I have written.

The facts stated in regard to twin-corn, and the conclusions I have drawn from them, are applicable to every variety of cultivated plant; and my only reason for confining them to one variety of a particular species, is, that I have made more experiments with *that* than with any other. I have *no pets* among any of them; my sole object being to ascertain, as far as I can, which are best in every respect to promote human comfort and general prosperity. As a proof of it in regard to corn, I am now making an experiment with six varieties; and should the twin-corn prove best, it certainly shall not be, from the least imaginable ad-

vantage derived from my management of the trial, which shall be as fair as I can possibly make it. But to proceed with my explanations. When I read your excellent article on agricultural hobbies and humbugs, of which I think precisely as you do, it seemed to me that you had gone so far in denouncing and ridiculing them, as probably to discourage all experiments made to ascertain the comparative superiority of the different varieties of plants of the same species. I therefore deemed it important to our cause, at least to endeavor to qualify, in some degree, your general denunciation, and to prove, as far as I could, not only that *all* plants heretofore tried, might be greatly improved in almost every respect, by the careful selection of their seed, but that there was so great a natural difference in productiveness between the different varieties of the same species, as to make it a matter of great importance to ascertain how far that difference might be augmented. If *you*, my good friend, are right, none but the over-sanguine will ever make experiments of any kind on this highly interesting subject. But should the doctrine *I* maintain be right, although hundreds and thousands of hobbies be mounted and broken down in the pursuit, yet, should a few only prove sound, they may amply remunerate both their riders and the public, for all the losses from the hobby-horsical experiments that fail.

It has been said that great inventors seldom become rich; but may not that enthusiasm which is so essential to success in prosecuting useful inventions, and which is the only quality strong enough to combat the ridicule always directed against every thing new, be incompatible with such a degree of economy as would enable them to accumulate wealth? Such, I am persuaded, is the fact; and that the money-making and saving talent is quite a different sort of thing from *that* which has so eminently distinguished the most remarkable inventors among mankind: *so different indeed*, as never to be found in the same individual. The hobby of the *one* is *money—money—money, for its own dear sake;* the hobby of the other, something that will hand down his name to the latest posterity, as entitled to rank among the benefactors of mankind. *His* passion is social, philanthropic, coextensive with the wants of his species; the passion of *the other*, begins and ends in self—self—self. If any great inventor has ever grown rich, I have never seen nor heard of him. But if this be true, some portion of what may be called *the hobby-horsical organ*, (if the craniologists will pardon my infringing their right to christen all the imaginary divisions and subdivisions of our skulls,) although too often injurious to the individuals whose noddles are bumpified by it, is quite as beneficial, upon the whole, to the general interests of agriculture, as it can be to the general interests of any other class whatever. *Ergo*, hobby-horses and hobby-horse-riders, are very useful things in a general point of view, although many of both may be often rendered worthless—the riders too much *galled* to ride any more, and the horses become utterly good for nothing by splints, spavins, ring-bone, and foundering, both in the legs and chest. The latter kind of foundering, if by *chest* be meant the *money-chest*, is so utterly ruinous to our class, that the fear of it too often deters all the half-way experimenters from attempting *any thing*, while it furnishes the "*good-enoughs*" with an everlasting pretext for attempting *nothing*.

The two positions I have sought to establish, which I understand you deny, are, first, that *all* plants heretofore cultivated, in any kind of soil or climate, wherein they will apparently flourish, are improvable, to a great degree, simply by regarding, in the selection of seed, the circumstances which you appear to think of little or no importance. Secondly—that among the varieties of the same species of plants, there is *naturally* a great difference in productiveness, which an all-bounteous Creator has enabled man to make still greater by judicious selection and culture. The universal practice of those who save seed either to sell, or solely for their own use, would seem to sanction my first position, although I admit there are many exceptions to the old saying, that "*what every one says must be true.*" But there is something more than mere practice in favor of this position. We have the testimony of very many credible persons, that they have much increased their crops, especially of corn, by always selecting their seed from stalks of the same variety which produced the greatest number of ears. Three of these individuals I know personally, and a fourth, Mr. Joseph Cowper of New Jersey, is known by reputation to all the reading agriculturists of the United States. Now, these persons did not state it as *mere matter of opinion*, but of *actual experience* during several years' experiments; and I have been willing to believe them; not only because my own experience confirms theirs, but because they ask no money for their disclosures on the subject; and that being the case, could have had no possible motive for humbugging their fellow-citizens.

My second position has in its favor, not only the testimony of many such men as your intelligent correspondent, Mr. Carmichael of St. Mary's, Maryland, but ocular demonstration for all who are willing to sacrifice their hobbies of opinion to visual evidence. For instance, no man can look through an apple-orchard in full bearing, without being forcibly struck with the very great difference in productiveness between the different varieties of apple, amounting often to nearly double. A similar difference may be noticed among several varieties of other fruits and vegetables, all going to prove that there *is* so great a natural superiority in productiveness among them, as to render it a matter of very great importance to those who cultivate them, either for use or sale, that they should choose among the grains, at least, only those varieties which produce most. To ascertain this, as I before remarked, is richly worth the breaking down of ten times as many hobbies, as the most fanciful and sanguine of all our hobby-horsical brethren put together have ever taken into training, from the days of Trismegistus to the present time. If I am right in my estimate of our state character, hobby-horsical planters and farmers are nearly as scarce with us as hen's teeth. The passion which makes such equestrians, is not among the besetting sins of the ancient dominion folks. *They* answer much better John Randolph's graphic description of them, who compared them to terrapins that would never move, after drawing their heads within their shells, until they felt the fire on their backs. In most matters, but especially in all that relate to husbandry, we want, *not the check-rein*, but *the spur and the lash;* not seda-

tive, but *highly stimulating medicine;* if mental stimuli can properly be compared to corporeal, and the former can be both prepared and administered to us far more easily than many imagine. You have only to call us "*the sovereign people;*" to translate for us the old Latin blasphemy, "*vox populi est vox Dei;*" to swear, at the same time, that it is literally true, and you may lead us "into the cannon's mouth." Then huzza! for us Virginia boys; who but *we!* although we may actually have sunk ourselves by our supineness as to all state concerns, and other political sins, to the very lowest grade in our great confederacy. But throw cold water on us, especially on *us* of the agricultural brotherhood, who are as cold generally as frogs, and you level us nearly to the "*caput mortuum*" of earth, into which, alas! our own prodigal waste and abuse of nature's bounties has converted a very large portion of the arable lands of our native state. Rely upon it, my good friend, that we Virginia agriculturists want, most grievously, all sorts of legitimate mental excitement, that can be applied with the least probability of success in promoting our cause. We have always too little, rather than too much steam, *party politics* always excepted. Our danger, meaning thereby the danger of our class, is caused by *too much* torpor; too much of *the good-enough malady*, and not by *the hobby-horsical extreme*. Pardon me, therefore, for saying, that you appear to me inclined to use the lancet, and its almost inseparable companion, calomel, (if such a figure be allowable,) somewhat more than is good for us. We of the clod-hopping genus have had quite enough, and to spare, of *depletion*, in all the modes wherein empiricism could injure us, either in religion, morals, politics, or husbandry—nay, in *body, and soul, and estate;* and what we most want now, is an abundance of that good old-fashioned sort of thing called *kitchen-physic*. But to procure it, although it be the staff of life, we, the said clodhoppers, require the excitement of censure and ridicule, for our numerous sins of omission, with unceasing commendations and praise, for every evidence of an inclination to quit the old beaten track, in which so many of us have nearly starved, for the purpose of trying, so far as our means will justify, all well-authenticated experiments that hold out a tolerably fair prospect of bettering our fortunes. Be it well understood, however, that I utterly exclude all *humbugs*, properly so called, from even the slightest claim to toleration. In plain English, they are, on the part of the contrivers, downright frauds to cheat the ignorant and credulous out of their money; and most heartily will I join you in a war of extermination against them, fearful as the odds may be against us. But for the hobby-riders, one and all, much as I often join in the laugh against them, I confess my sympathy is "pretty considerable," as brother Jonathan says. For this, *you* probably, as well as *some* of my other readers, will think I have good cause, if near relations ought to sympathise with each other. Be this, however, as it may, there is certainly more color of excuse for those poor fellows in Virginia, than in any other state in the Union: for *our* agriculture is literally "*sick almost unto death;*" and you know that "a willingness, nay, an anxious desire, to be cured of any dangerous and alarming disease, is perfectly natural; and the danger usually leads those who are threatened by it, to catch at all sorts of proposed remedies."

Thus endeth my long, and I fear, tedious homily, in regard to which, let me conclude by begging you to correct me, if I have so far misunderstood your opinions as to misrepresent them. Should we really differ materially, and any good to our cause grow out of the public expression of that difference, I confidently trust that neither of us will feel any such foolish pride of opinion as will prevent him from heartily rejoicing at the general result, even should the verdict of our brethren be given against him. Discussion, full, free and friendly discussion, of all important agricultural subjects, and willing, unprejudiced readers, are what our cause in Virginia most grievously wants; for our everlasting political party quarrels have nearly banished the language of gentlemen from all argument, whether oral or printed; while to read any thing in relation to husbandry, is deemed such up-hill work, such a waste of time, by most of our brethren, that all imaginable pains should be taken to change, if possible, so paralyzing, so stultifying a habit. That your highly laudable efforts to do it may be crowned with entire success, is the constant and earnest wish of

Your old friend and fellow-laborer,

J. M. G.

REPLY TO THE FOREGOING, AND SOME OTHER OBJECTIONS.

We have been singularly unfortunate in conveying the meaning designed in some of the passages of the article commented on above; which appears, not only from some of the objections urged by our present correspondent, but from several others. This misapprehension is doubtless caused by the hasty and careless mode of expression used; and therefore we readily lay the blame at our own door. But, the general positions there assumed, (and by which the words of particular illustrations and examples should be construed,) still seem, to our understanding, so plain, that we fear that any additional explanation will scarcely dispel the existing obscurity. To avoid repetition now, we would request of readers to refer to the article in question, (especially the portion on pages 48 and 49,) for examination of the grounds assumed or denied.

We were far from meaning to deny the importance to the product of crops, of a *proper* selection of seeds. On the contrary, (putting aside many and strong expressions of ours in other editorial articles, which we cannot expect readers to remember,) in this piece in question, the advantage of such selection is fully and directly admitted in particular passages, as well as fairly to be inferred from the general context. It is there said, that "it is highly important to adapt the kind of seed to the soil, climate and usual seasons; and the *want of such adaptation may reduce a crop to less than half of what might have been obtained from other seed.*" This surely was saying, though generally and indirectly, yet strongly and explicitly, that by a proper choice of seed, a crop may be, in some cases, even doubled in amount. This greater productive power of one variety of a particular grain over another, was ascribed, not to qualities such as are usually recommended, and sought for in "hobbies," or new pet grains, but to the suitableness of the plant to the circumstances

under which it is to be placed, and its fitness, from any peculiarity of character, to resist the disasters to which the crop is to be particularly exposed. "But," continues the passage, "we have not the slightest faith in any of the many prevailing opinions, that larger crops are to be obtained by choosing seed *on account of the form, size, or number of grains, or the size or number of ears, &c.*" In this last position, only as we understand, and according to the meaning before intended to be conveyed, we are directly opposed to our friend and correspondent J. M. G.; and it is a question to be settled not by argument, but by proper, varied, and sufficient experiments; and we are willing to abide by that test, when enough of such experiments are reported.

As all the particular objections are embraced in the general disclaimer just made of denying the efficacy and profit of proper selections of seeds, it is unnecessary to reply to them separately and in detail. One only will be mentioned, because it is founded on another misapprehension of our meaning. This is our inferred "apparent preference for corn with the largest cobs." If any such ground for preference had been expressed, it would have been obnoxious to much stronger objection than what is urged by our correspondent; for it would have been directly opposed to the general principle which we had assumed as correct. We were quoting the opinions and grounds of preferences of others, and accompanied with intimations of dissent, if not of derision, on our part. The "mathematical truth," also, in regard to which we differ, (and mathematical truths, real or supposed, rarely permit a difference in argument,) was stated simply as an illustration of Col. Taylor's ground of choice. Also, in stating a mathematical truth, we ought to have been more strict in terms and definitions; and for want of that strictness of language, our correspondent has certainly succeeded in picking a hole in our "mathematical truth." While admitting, and submitting to the correction, we beg leave to supply the omission of what was meant to be affirmed of ears of corn, and to repeat, that it "is evidently and mathematically true, that if the grains are of equal size, [*and also of like form,*] there will be more of them encircling a large than a small cob."

Another correspondent, in number 3, (at page 178) supposes that we meant to class the ruta-baga, or Swedish turnips, among the family of humbugs. Not so, by any means. On the contrary, they were spoken of as long known in England and "valued for their real advantages," and treated of in English books, before introduced in this country as "Russian turnips," and spread as a novel product of rare and superlative value. This introduction, and the means used to recommend and extend the general culture, was a humbug, though the plant is highly valuable, and its culture profitable, in all suitable climates and circumstances. As fanaticism and quackery are often exercised in the spreading, or ostensible design of spreading, the beneficial influence of true religion and morals, so the true doctrines and valuable products of agriculture may be so recommended by interested falsehood, so as to become humbugs, in the light in which they were there presented.

Neither was it our design to repress or to moderate the ardor of any to try new things. Precisely the contrary was stated expressly, and fair trials strongly recommended.

Still less did we intend to denounce as humbugs the act of *hobby-riding*, or to cast any censure on the enthusiastic individuals who form that class. As our friend J. M. G. intimates, we are among the last who have any right to undervalue that class, of which both he and ourselves have long been, and will doubtless always continue to be members. But though there is nothing to censure, and much to approve, and for the community to be grateful for, in the acts of the riders of hobbies, still it must be admitted that there is also much of extravagance to laugh at; and as we are willing to bear our share of this infliction from others, we have considered that we had a good right to laugh at the follies of some of our brotherhood in return; still claiming for the whole class, and valuing not slightly our own share of the claim, that sanguine experimenters, or hobby-riders, are among the benefactors of mankind, and generally to their own loss, even in their successful labors. Our censure was not thrown on the riders, but upon the grooms and jockies who trained and brought out the steeds, to serve their own interested purposes.

We have to add a word in defence of an expression, not of our own, but of a correspondent whose statements are entitled to high respect. This is the opinion that the bread made of the twin-corn was not so palatable as that of our common corn. This opinion may be correct; or precisely the reverse of it, as stated by our correspondent, may be true. It is a matter of taste, which is not to be settled by argument or evidence. But without joining in this opinion, we know the fact that this supposed inferiority of the twin-corn has been charged by another individual, who did not know of any such opinion having been previously expressed. For our own part, we believe that there is no material difference; as none was perceived, when we changed, without knowing it, from using the bread of one kind to that of the other corn.

ED. FAR. REG.

From the Genesee Farmer.

QUALITY OF MILK.

Further experiments appear to be needed relative to the quality of milk, for the different purposes of cheese and butter-making. It is well known that the *quantity* of milk alone, yielded by a cow, is not a sufficient test of her excellence. The *quality* is of such importance, that many animals furnishing but comparatively little, are, on account of its richness, truly valuable. The following extract from Moubray may serve well to introduce this subject to the attention of farmers, and to throw some light upon it. It is an account of the product of one cow, for one year, and shows in a strong point of view, the superiority of the milk over that of our common animals. This cow was of the Sussex breed.

"Mr. Cramp's cow was seven years old, had produced five calves, and had been two years in his possession. She was fed in *summer* on clover, rye-grass, lucern, and carrots, three or four times a day. In *winter*, with hay, bran, and grains, and often fed, particularly when milking. The manger kept clean, and no sour grains, rotten or mouldy vegetables given, on any account, and the cow never suffered to overcharge her stomach, but to be well filled, and kept with a good healthy appetite. Always when milked, stripped clean to the last drop. Being so well kept, she went dry only seventeen days before calving.

Quantities of milk and butter produced by Mr. Cramp's cow, between April 1807, *and April* 1808.

From 6th to 20th April—milk 8 quarts per day, butter 6lbs. per week. From April 21st to June 2d—milk 22 quarts a day, butter 18 lbs. per week. From June 2d to October 5th, milk 20 quarts per day, butter 16 lbs. per week. From Oct. 6th to November 30th—milk 15 quarts per day, butter 13 lbs. per week. From December 1st to February 8th 1808, milk 13 quarts per day, butter 11 lbs. per week. From February 9th to March 14th—milk 10 quarts per day, butter 8 lbs. per week. From March 15th to April 4th—milk 7 quarts per day, butter 5 lbs. per week,—dry for calving.

Sale of the year's produce and expenses.

	£	s.	d.
Sale of calf 14 days old—butter at 1s. 4d.—skim milk at 1d per quart—dung, valued at £3, in all, - - -	76	7	3
Total expenses, including £1 5s. for 10 sacks malt combs, and a farrier's bill 12s. 6d. - - - - -	24	14	3
A year's net profit on a single cow,	£51	13	0"

It will be perceived that the quantity of milk yielded by the above-mentioned cow did not much exceed some of the best of our common animals, but in the quantity of butter she greatly surpassed them.

The following remarks by John Hare Powell, published some years since, on the qualities of the improved short horns, furnish some hints on a branch of this subject, which is of great importance, but has been hitherto but little investigated. In allusion to a sale of some of these celebrated cattle he says,

"There are about twenty or thirty head of the full blood, besides nearly as many of the common and mixed blood. Among the former is the celebrated Bellina, the famous butter cow. In her appearance, she is far below many of her companions, though when critically examined her *points* are all good. The straight back—the perfect level of the spinal column from the horns to the tail,—the square sides, the wide hips, the full brisket, the intelligent countenance, and wide spreading bag, are all there; *but she makes a pound of butter at every milking*, and hence she has not the sleek fat sides, and the filling up so necessary to a finished and beautiful subject. She illustrates the idea perfectly, which we have so often inculcated, that a deep milker or a great butter yielder cannot easily be kept fat. She illustrates another position we have advanced, that milk from different cows, apparently of equal richness, is very differently constituted. *In some, cheesy matter and whey prevail, in others cheesy matter and oil, and in others oil and whey prevail with but a slight quantity of cheesy matter.* The first is common milk, affording a small quantity of cream, and poor skim milk; the second affords a medium quantity of cream, and makes good cheese, and good skim milk; the last affords a very large quantity of cream, no cheese scarcely, and very poor skim milk—so poor indeed, that it is scarcely fit for use. This latter is the case with Bellina; when her milk has stood the proper length of time, the cream, (the milk being three or four inches deep,) is nearly half an inch thick, *and so firm that it will almost bear lifting like a buckwheat cake*, the skim milk being very inferior. Mrs. Barnitz took about half a pint of her cream in a bowl, and in a few minutes produced six ounces of the finest butter we ever tasted, by simply stirring it with a tea-spoon. The butter-milk produced was less than a small wine glass full, and that quite of a poor quality. This cow, unlike the generality of her breed, has coarse hair, and is of ordinary size, and as before remarked, would be taken for an ordinary animal, except upon critical examination by a very good judge."

To be able to ascertain readily, by simple experiment, the character and quality of milk, would be to dairy farmers of the first importance. It would be bad policy to attempt to make butter from milk affording cheesy matter alone, or to manufacture cheese from milk abounding only in oil. The distinguishing characteristics of milk in relation to these points, whether by specific gravity, color, or other particulars, should claim particular attention.

It has been recommended as the best means of determining easily the richness of milk and the quantity of butter it contains, to fill a number of broad, graduated glass tubes, with milk of different kinds, and after the cream has risen, to observe its relative thickness at the top of each. But this, although ingenious and apparently correct at first glance, has been found fallacious. Neither is the *color* of the milk a true test. A few observations, hastily made last autumn by the writer, prove further experiments necessary. One cow gave from ten to twelve quarts daily; the milk was paler than usual, and the cream lighter colored; but with one exception she was the best butter cow in the yard; the cream, though not equal in thickness on the surface to some, was uncommonly *firm and tenacious*, resembling that described in the last quotation above; leaving but little butter-milk, and apparently consisting almost wholly of butter. She produced from six to seven pounds of excellent butter per week. Another cow yielded milk of a richer yellow, which produced a thicker coat of cream; but this was lighter and more spongy, and a less quantity of butter was afforded.

It would be well worth the time and labor of scientific farmers, who can constantly superintend their dairies in person, to give particular attention to this subject, and to endeavor to ascertain by well conducted and accurate experiments, ready and correct tests for the character of milk, or whether best adapted to cheese or to butter-making, and the quantity of each afforded; and also to determine the best mode of causing their complete separation from the whey. Butter-makers should know the precise temperature needed for the pro-

per separation of cream from milk, and the butter from the cream, and the *time* required for each process to be effected in the best manner. No dairy room should ever be without a thermometer.

Proper and profitable selection and purchase of cows for a dairy, would be greatly facilitated by the knowledge of such tests. A single fact may show in a slight degree, the advantage of selection. Cows were purchased for the farm of the writer, for making butter, and the character of good butter-makers sought, so far as a very imperfect knowledge could direct. The animals were no better in appearance than common, but in less than three months in autumn, during a part of which they had greatly diminished in milk, *four* of them* furnished three hundred pounds of excellent butter. These did not include one of the best butter-makers.

J. J. T.

From the Gentleman's Magazine, for 1766.

THE ADVANTAGES OF PEAT-ASHES IN DRESSING LAND, AND THE METHOD OF PREPARING COAL-ASHES FOR THE SAME PURPOSE.

Peat-ashes, properly burnt for a manure, are noble improvers both of corn and grass-land; but the substance from which they should be got, is an under stratum of the peat, where the fibres and roots of the earth, &c. are well decayed. Indeed the very best are procured from the lowest stratum of all. This will yield a large quantity of very strong ashes, in color (when first burnt) like vermilion, and in taste very salt and pungent. Great care and caution should be used in burning these ashes, and also in preserving them afterwards. The method of burning them is much the same as burning charcoal. The peat must be collected into a large heap, and covered so as not to flame out, but suffered to consume slowly, till the whole substance is burnt to an ash. The ashes thus burnt, are held in most esteem; but the peat-ashes burnt in common firing, are, in many places, used for the same purposes, and sold at the same prices.

Peat-ashes are found excellent in sweetening sour meadow-land, destroying rushes, and other bad kinds of grass, and, in their stead, producing great quantities of natural grass.

They burn great quantities of peat-ashes in some parts of Berkshire and Lancashire, and esteem them one of the best dressings for their spring crops.

A very great improvement may likewise be made, and at a moderate expense, with coal-ashes; which, when properly preserved, are also an excellent tillage. The improvement is, putting a bushel of lime, in its hottest state, into every cart-load of coal-ashes, when carried out upon the land; covering it up in the middle of the heap for about 12 hours, till the lime is entirely fallen, and then incorporating them well together, by turning them over two or three times; by which the cinders, or half burnt parts of the coals, which are noxious to the ground, instead of being useful, will be reduced to as fine a powder as the lime itself. The coal-ashes should be carefully kept dry. Coal-ashes, thus prepared, are the quickest breakers and improvers of moorish and benty land.

* One of these yielded *nine* pounds of butter per week. They had common pasture only.

From the Gentleman's Magazine, for 1766.

AN ACCOUNT OF THE INTRODUCTION OF RICE AND TAR INTO OUR COLONIES.

John Houghton, a sensible writer on trade and husbandry, Vol. II. page 298, enumerates the commodities imported into England; among which he mentions rice, and gives the following account of it, probably from the custom-house books or bills of entry.

Rice imported in the year 1694.

From the Straits,	1545 cwt.
From Spain,	120 ditto
From Holland,	330 qrs.

But as he takes no notice of rice from Carolina, it is probable it was not then planted there, which will appear with still stronger evidence by the following account.

In the year 1696, my sagacious friend, Charles Dubois, then treasurer to the East India Company, told me often with pleasure, that he first put the Carolinians on the culture of rice.

He happened one day, in that year, to meet Thomas Marsh, a Carolina merchant, at the coffee-house, to whom he said, I have been thinking, from the situation, nature of the soil, and climate, that rice may be produced to great advantage in Carolina: but, says Marsh, how shall we get some to try? Why, says Dubois, I will inquire for it amongst our India captains. Accordingly, a money-bag full of East India rice was given to Marsh, and he sent it to South Carolina; and in the year 1698, he told his friend Dubois, that it had succeeded very well.

But, from so small an original, it required a long time to spread to advantage; besides, the people being unacquainted with the manner of cultivating rice, many difficulties attended the first planting and preparing it, as a vendible commodity, so that little progress was made for the first nine or ten years, when the quantity produced was not sufficient for home consumption.

About this time, a Portuguese vessel arrived, with slaves from the east, with a considerable quantity of rice, being the ship's provision; this rice the Carolinians gladly took in exchange for a supply of their own produce. This unexpected cargo was distributed, which gave new spirit to the undertaking, but was not sufficient to supply the demand of all those that would have procured it to plant.

Therefore the Assembly of South Carolina, taking into consideration the importance of the culture of rice, very prudently voted a bounty to encourage its importation, that there might be a supply of seed for every undertaker.

My ingenious friend, Tho. Lambol, esq. now living, informs me, that in the year 1704, being then a lad, going to school at some distance from Charles-Town, he took notice of some planters, who were essaying to make rice grow.

In the year 1712, the same gentleman was an

apprentice to a principal merchant in Charles-Town, who was appointed public treasurer; and he well remembers that a bounty (granted by the Assembly) was then paid to a captain, who brought in the first cargo of rice, after the bounty was ordered: this cargo came from the Straits, probably from Egypt, or the Milanese.

In the year 1713, another ship arrived, and the captain made the like demand, and received the bounty for bringing a cargo of rice and slaves from Madagascar.

From these particulars it appears, that the progress of raising rice in any considerable quantity, was very slow; and I can find no account of any being exported for the first fifteen years. But it is reasonable to conclude, that after the arrival of these two cargoes of rice, for sowing, the planters were amply furnished, to extend its culture; and being a yearly production, it soon became a staple commodity; it is therefore very probable, that in the years 1715 or 1716, a quantity was raised sufficient for exportation, which continued to increase till the year 1726, and then it became a great article of commerce. For my correspondent, Sam. Eveligh, a merchant residing in Charles-Town, writes to me that, from the year

		Barrels of rice.
1726 to 1727	were exported	40,000
1729 to 1730	exported	41,957
1740 to 1741	exported	80,000
1755 to 1756	exported	60,000
1757 to 1758	exported	67,040
1760 to 1761	exported	100,024
*1761 to 1762	exported	34,972
	half barrels	3,600

The Carolina Gazette of June 12, 1762, says, the crops of rice are so great that we expect to make 150,000 barrels.

I cannot express the satisfaction I feel, in reflecting on the wonderful increase of so valuable a commodity, from so small a beginning, in about, or little more than, half a century.

May 26, 1766. P. COLLINSON.

After having given all the intelligence I could collect relating to the culture of rice, it may not be unacceptable to give some light into the original of tar and pitch in our colonies.

Before this, we were beholden to the northern powers for all the tar and pitch consumed in England, which were imported from Sweden and Norway, and for which vast sums were annually paid.

I was long acquainted with Captain Coram, institutor of the Foundling Hospital, and from him I had the following relation: That he was master of a vessel in the Baltic trade; that great part of his lading was tar and pitch, by which he became acquainted with the value of those commodities. He was much incensed at the extortion of the Swedes and Danes, in raising a barrel of tar to the exhorbitant price of fifty shillings; but as we had then no other markets to go to (for Russia had no ports in the Baltic) we were obliged to give it: but the next voyage he made to Sweden, he took an opportunity to observe their method of making tar and pitch.

He concluded, that there was no way so effectual to bring down the price of those commodities, as by the making them in our own colonies; and as he was fully persuaded of the practicability of it, he determined, next voyage to New England, to make the experiment; it succeeded; and he made the first barrel of tar in the year 1698, and brought it over, to show that it had all the qualities of the Swedish tar. After proper examination of it, its goodness was allowed, and he then petitioned the parliament to promote the making tar and pitch in our colonies, by giving a bounty on their importation.

With this encouragement, tar-making soon spread over the colonies; for my friend Lambol, of South Carolina, writes, that in the year 1704, he well remembers hearing some planters felicitating each other on the easy raising of tar and pitch, *instead of indigo*, which they had attempted unsuccessfully.

This public-spirited man, Captain Coram, happily lived to see his single barrel of tar the original of many thousands annually imported; as well as my benevolent friend, Charles Dubois, who often expressed the pleasure it gave him, that he first advised the culture of rice in Carolina, and that his little bag was the original of many thousands that he saw brought over before he died, which happened in 1740. It is remarkable, that these two valuable articles of commerce were introduced much about the same time. If I am rightly informed the making of indigo was revived very successfully in South Carolina in the year 1740. It is an article of such importance, that it deserves the greatest diligence and attention to make it of the best quality, that we and our colonists may have the benefit, and not our rivals, the French and Spaniards, to whom such great sums were yearly paid, for a commodity that may be so easily raised in our southern provinces; the consumption is so great, that we do not at present import sufficient to supply our wants. As rice seems to be overdone, it is to be hoped, that the planters in Carolina and Georgia will turn their hands more to making indigo, as the demand is so great, and the bounty so encouraging.

After many fruitless attempts, the making pot-ash in our colonies has at last happily succeeded in New England; the first fruits of its produce were sent over in the years 1764 and 1765, which proves so good, that it is said to excel the Russian pot-ash; it will therefore prove a very great advantage to that colony, where returns of their own raising are so much wanted.

* Probably this year they turned their hands to making indigo, of which they made 239,629 pounds.

AGRICULTURAL PAPER IN WISCONSIN.

We received lately the first numbers of a new agricultural paper, published at the unheard-of town of Milwaukee, which is farther north-west (as it would seem from the title,) than the art of spelling has yet travelled. It is called the 'Wisconsin Culturist, and *Gardner's* Magazine.' The No. of April 17, contains the list of prices-current which is copied below entire, as a curiosity. It appears, from this list, that every thing to eat in Milwaukee bears a very high price; but on the other hand, agricultural information rates as low in the market there, as if the editor's and publisher's profits were lower than the wages of common laborers; which, however, is often the

case, in places where labor is much cheaper than it is in Milwaukee. This paper (in small quarto,) is published once a month, for $1 a year; and it would be inconceivable how it could be afforded so low, in such a place, if the mystery were not explained by the advertisements showing that the paper is an appendage to a seed-store, and nursery, according to the usage of some other and older parts of our country.

"*Milwaukee price current*, [*April* 17, 1838.]

Beans, white field,	- -	bush.	$3 50	*a*	4 00
Peas, blue imperial marrowfat,		bush.	3 50	*a*	4 00
Beef cattle, on the hoof,		100 lbs.	8 00		
Flour, best,	- - -	bbl.	10 00	*a*	12 00
Grain, wheat, common spring,		bush.	2 00	*a*	3 00
Italian,	- -		2 75	*a*	3 25
Oats,	- - -		75	*a*	1 00
Corn,	- - -		2 00		
Corn for seed,	- -		3 50	*a*	4 00
Corn Meal,	- - - -		2 00		
Bacon, Hams,	- - - -	lb.	16	*a*	18
Shoulders,	- - -		15	*a*	16
Lard,	- - - - -		15	*a*	16
Butter by the keg,	- - -		25		
Cheese,	- - - - -		16	*a*	18
Eggs,	- - - -	doz.	31	*a*	38
Cows, new milch,	- -	each	30 00	*a*	35 00
Grass-seeds, red clover,	-	bush.	16 00		
Timothy,	- -		3 25		
Hay,	- - - -	ton	10 00	*a*	12 00
Pork, prime,	- - -	bbl.	21 00	*a*	25 00
Mess,	- - - -		26 00	*a*	30 00
Lime,	- - - - -		1 25	*a*	1 50
Wood,	- · - -	cord	2 00	*a*	3 00
Sugar, maple,	- - -	lb.	12	*a*	15
Laborers' Wages,	-	month	15 00	*a*	20 00"

A NEW WATER-FILTER.

Some six or seven weeks ago, when the water of the Schuylkill was so yellow and turbid, and all the conduits from Fairmount ran discolored streams, the following discovery, which we find in the London Morning Chronicle, would have been a blessing, as it may always be henceforth. A Mr. James Richards, of Dumbleton, writing to the editor, observes: "I have discovered a cheap filter to cleanse river water, which you willoblige me to communicate to the public, as it may be useful to the inhabitants of London, Westminster, and other districts where clean soft water is preferred to dirty or hard water. It is nothing more than a bag made of unbleached calico, in the form of an inverted cone, attached to a small wooden hoop, and in this country called a dropping bag. It is first saturated with water, afterwards pulverised charcoal is thinly spread over the inside of it with a dredging-box used by cooks. At first, a part of the charcoal will pass through the pores of the bag with the water, but by continuing to fill it *full* with the same water, and adding charcoal, in a few minutes it will become as clear as spring-water. To prevent the charcoal being washed from the pores of the bag in filling it, place another bag inside it, and dredge a small quantity of pulverised charcoal into it. The cost of both bags is under one shilling, and the two I send you will cleanse from fifty to sixty gallons daily, if it be supplied with water from a pipe and regulated by a stop-cock, and more in proportion to the size and in number as may be required. I have used these filters the last month, and hope the use of them may add to the comfort of others."

This plan, it will be seen, is extremely simple, and within the means of every citizen. Why should it not be generally adopted in Philadelphia?—*Philadelphia Gazette.*

ON THE SOURCES OF MALARIA, OR AUTUMNAL DISEASES, IN VIRGINIA, AND THE MEANS OF REMEDY AND PREVENTION.

By the Editor.

Throughout the course of publication of the Farmers' Register, it has been one of the main objects of the editor to attract attention to the causes and effects of malaria, or unhealthy marsh-effluvia, and to enforce his views as to the means of restraining or preventing this greatest of the evils under which the eastern half of Virginia suffers. To forward this end, every fit opportunity has been availed of; and the subject has been treated, directly and at length, or incidentally and slightly, in various articles in these volumes. But there has been found but little if any encouragement to persevere in this course. The editor has, alone, and without any certain evidence of approval of his views and his course, and certainly without any practical adoption of his recommendations, labored in this cause, which, to his understanding, demands the support of all, on considerations of economy and agricultural improvement and profit, as well as on the more important grounds of the strength or frailty of the tenure by which the people of half of our entire territory possess and enjoy health, happiness, and even life. It is under such impressions of the high importance of the whole subject, that the readers of this journal are again invited to its consideration; and, probably, for the last time, by the present writer, if there continues to be no more interest excited, and action produced, in regard to the evils existing, and which are multiplied ten-fold in power by the ignorant and careless legislation of this commonwealth.

The views of the writer on this subject were presented generally, and at some length, in an editorial article (pp. 41 to 43) in Vol. V, on the causes of, and means for preventing, the formation and the effects of malaria in eastern Virginia; and also in sundry shorter incidental passages in each of all the volumes, in connexion with articles on marshes, mill-ponds, and canals, &c. &c. But as it would be requiring too much of readers that they should either remember, or carefully refer to these various articles, a general, though slight view of the whole subject will be here presented, sustained by additional facts, which have been recently learned by personal inquiry and observation.

That the common autumnal or bilious diseases of eastern Virginia, and especially of the tide-water portion, which is most subjected to them, are principally caused by the effluvia rising from wet lands, is a matter in which all concur. The gene-

ral difference between the presence of these disorders, in low, wet, or marshy countries, and their absence, or scarcity, in mountainous and dry regions, is so great, that none can mistake, or differ about, the *general* causes and effects. But from this general opinion, which is true in the main, (though having numerous and important exceptions,) there is deduced the erroneous conclusion, that these opposite general effects produced on health, in extensive regions either generally low and wet, or generally hilly and dry, are produced by these opposite natural features, and cannot be very materially altered by art; as art cannot materially alter the natural character of the land. Or, in other words, that nature has made one great region low and sickly, and another high and healthy; and that man cannot do much to counteract the law of nature in either case. Perhaps none may maintain this position, in argument, without admitting partial exceptions in numerous particular cases and localities. Indeed, every man will say that care may lessen the causes and mitigate the operation of malaria, in a sickly region, or increase both in a healthy one. But, judging from the action of both the people and their laws, which speaks more strongly than words, it may be inferred that it is a general belief that such bendings of nature from her course can be but slight, in particular cases, and scarcely worth estimating on a broad scale, or through an extensive country. In entire conformity with this supposition, it is a notorious fact that very few individuals in Virginia have done any thing considerable, or on system, to protect their dwelling places from malaria; and the government has not only done nothing for general protection, but has actually caused the worst of the existing evils, and is encouraging their continued increase and aggravation, by the fixed legal policy of the country; which permits the raising of mill-ponds, which are productive of little else than malaria and disease; and indirectly, but effectually, forbids the drainage of extensive swamps. The production and deadly effects of malaria, in eastern Virginia, for the greater part, is to be charged, not to the laws of God, but to the laws of man; which, in this respect, operate to put away or sacrifice some of the most precious of God's blessings, offered to all, to gratify the whims, or the blind and often mistaken avarice of a few individuals. There are, doubtless, great *natural* differences as to the sickliness of differently situated regions; as between the low tide-water region of Virginia, the central or hilly, and also the mountainous region. But, in their natural state, before damaged by mill-ponds and other of man's miscalled improvements, the low-country was probably less afflicted by malaria, than the hilly parts now are, or may be rendered by the full extension of these injurious operations of man. This is a matter of mere supposition, and cannot possibly be subjected to the rigid test of proof by known facts. But, from reasoning, and inferences from such facts as are known, it seems most probable that some of the now most sickly counties on tide-water were, at the first settlement of the country, less sickly than the hilly and originally very healthy county of Brunswick, for example, has become in latter years.

Even the very important fact of increased and increasing sickliness in this country, is entirely without support from any known written authority; and the whole subject has been so little examined, or thought of, that to most readers the position here assumed may be entirely new. There are no statistics of health to which we can refer for proof. But general and historical facts, few as they are, if fairly considered, will suffice to place the question beyond dispute.

Before proceeding further in this part of the argument, let me remark, that I am opposed in the outset, and shall be opposed throughout, by the reluctance felt by every individual to believe, or if believing, to admit, that his particular property, or place of residence, is more sickly than others, or has become more so than in former times. This self-delusion, and consequent, though perhaps undesigned effort to deceive others, is almost universal. Each man claims for his own place more healthiness than in truth ought to be admitted; and the combined effect of all these individual claims, is to maintain that the whole country is more healthy than is true, and more so than each individual would have claimed for it, with the exception of his own farm and his own neighborhood. It is against this universal prejudice and obstruction that I have had to contend in seeking for facts, and shall have to contend in argument; and, with such opposition, there is but small hope of maintaining my ground, or producing conviction of the soundness of my views, in the minds of those who have so prejudged the case.

One of the strongest proofs of the greater former healthiness of the low country, was the settlement of our English ancestors having been made and continued at Jamestown. It was on May 13th, when they landed; and now, a residence on that spot, or in that region, continued for five months after that time of the year, would be fatal to half of the strangers from a northern climate, even though provided with all the comforts and necessaries which a long-settled country affords, and all of which the first settlers most deplorably needed. It is true, that for some years after the first settlement, there was much sickness, and numerous deaths; and that in fact the infant colony was more than once on the point of extinction. But these diseases and deaths do not seem, from the direct and the still stronger indirect testimony of history, to have been attributed by the sufferers to an unhealthy location; and there were sufficient other causes for all that was suffered, in the usual and unavoidable privations of the first colonists of a new and savage country, added to the extreme improvidence and mismanagement of these settlers, and their government, as detailed in history. Even after several years had passed, and though cultivating a very fertile soil, and aided by annual supplies of food from England, and with all the resources of trade with the savages, hunting, and fishing, still, want of food was one of the greatest causes of disease and death. Of course, there must have been, under any circumstances, more or less of disease caused by malaria; and although any predisposition to such disease, naturally induced, must have been violently urged to action, and aggravated to ten-fold malignity, by hunger, intemperance, exposure of every kind, depression of spirits, and every other painful emotion of the minds of men in such desperate straits—still, even with all these aids, the prevalence of autumnal diseases, the effect of malaria, was not so conspicuous as to stamp the character of sickliness on the

location, nor to induce even the proposition to remove the colony, or afterwards its seat of government, to a much higher or more healthy situation. The unavoidable inference seems to be, that the great sickliness of the early settlers was not attributed by themselves, to the climate. Yet, this was a question on which they could not possibly have been deceived. And even if most others had been deceived, by ignorance, and the want of experience of the effects of malaria, this could not have been the case with Smith, the most efficient director, and the true founder of the colony; who would have known better, not only by his general intelligence, but also by his experience of such effects, gained in his campaigns against the Turks. It may be alledged, that fear of the savages, stronger than the dread of disease, caused the choice of, and after-continuance on, an unhealthy spot, because it was more easily guarded on the land-side, and perfectly accessible to ships. But spots equally favorable for defence, and on deep water, might have been selected at first, much higher up the river; and yet Jamestown and its immediate neighborhood continued to be the chief place in Virginia, after the power of the savages had been crushed, and settlements had been extended to distant and inland places. The proof of my position would be sufficiently proved by any attempt made now to settle Englishmen, just arrived, on the border of almost any of our tide-waters, and especially about the junction of the salt and fresh waters. Several such trials have been made with foreign laborers; but the first autumn was enough to put an end to each experiment, by inflicting so much disease and death as to prevent any of the foreigners remaining through another season, who could possibly move away.

There can be but little doubt also, but there was much less of autumnal diseases, or at least of violent and fatal diseases, before the revolutionary war than now. There was no such thing then, as the healthy residents leaving home in summer, as is so usual now, to spend the sickly season among the mountains, or at the north; nor, does it appear, that there was much suffering for want of such resources, although, the climate must even then have become very far more unhealthy than in the early times of the colony.

Another striking proof of the increased tendency of the country to produce disease, even within the last sixty years, is presented by history, in the circumstances of the occupation of Yorktown by the British army in 1781, and the siege carried on by the American army; and especially in regard to the hastily-levied militia from the mountains, and other high and healthy parts of Virginia. Cornwallis chose his position first in Portsmouth, and afterwards in Yorktown, with a view to health, as well as defence, to await the arrival of reinforcements from New York. His army was concentrated at Yorktown, August 22. Washington reached Williamsburg, September 14, and the American army moved on thence to invest Yorktown, Sept. 30, and the surrender of the British army was made on Oct. 19th. Thus, both armies were exposed to the worst part of the malaria season, and the British army to the whole of it. Among the besiegers, were raw militia just raised for the occasion, from Rockbridge county, (of which portion I have been more particularly informed,) and probably from sundry others of the mountain-counties. There was certainly much sickness, and especially among the British troops; but not more than is usual in camps and especially in besieged camps, suffering all the privations incidental to the confined situation. It does not appear, from the very slight notices in history, that there was more sickness than might have been expected if the same circumstances had occurred in the hilly middle region of Virginia. Yet, if the like circumstances could occur now, it can scarcely be doubted but that every soldier, not already acclimated, and accustomed to malaria, would be made sick; and that probably half of those just brought from breathing the pure mountain-air, would never return home.

Another indirect proof is presented in the great and deplorable decline of most of the lower counties of Virginia in wealth, and in the usual accompaniments of wealth, which formerly made a residence delightful in many neighborhoods in which there is nothing now left to invite any one to remain. It is true that other causes, political and economical, have concurred to produce this result. But the most potent of the several causes, was the slow and silent, but continual and increasing warfare on the health of body and mind, made by the action of malaria. By its operation, when scarcely amounting in effect to positive and known disease, the mind is sickened even more than the body. The buoyant spirits are tamed—energy is relaxed—the keen appetite for enjoyment, (which is the greater part of happiness,) is lost; and the victims of malaria cease to strive, or to enjoy; and either sink into apathy and listlessness, or urged by discontent, more than by any remains of energy, take the final step of emigration to the western wilderness.

But the upper country furnishes still stronger evidence, because of positive and unquestionable facts, to prove an increase of the product and effect of malaria. The hilly country between the falls of the rivers and the nearast mountain-range, with the exception of some comparatively small spots, on swamps and rivers, was formerly as free from this scourge as is now the mountain region. But the number and the extent of the unhealthy places have greatly increased, within the memory of those now living; and some large districts have been, in particular seasons, as subject to bilious diseases, and still more to violent ones, than the tide-water region. Indeed, in very many places, universally believed (unless by the mill-owners,) to be injuriously affected by the neighborhood of mill-ponds, these effects of malaria are of as regular recurrence in autumn, as on places near to any of the marshes of the low country; and are much more dangerous.

The third and highest region seems destined, notwithstanding its better defence in mountain sides and peaks, and the rarity of flat surface on which to form wide and shallow ponds, to take its turn next, as the victim of malaria. Already, in that part of the mountain-region in and about Frederick county, there have been particular autumns which seemed almost pestilential. And though such cases of general and virulent disease are rare, particular cases of autumnal diseases are now frequent in many such places where they were rarely heard of thirty years ago.

These statements may be considered by some as exaggerated or unfounded—and, by others, if

admitted to be true, considered as showing the want of both patriotism and policy, in the writer's thus exposing the enormous existing and still growing evils under which the country suffers. In regard to the former point, I admit, in advance, the scarcity of particular and positive facts, to serve as proofs, which is found throughout the whole subject; and that among the existing difficulties of obtaining such facts, (and still more by a single and unaided individual, who has had little opportunity to make proper researches,) I have to rely mostly upon general and loose opinions, and deductions from general facts. Hence, there is much liability of mistake. But if the public can in any way be driven to the examination of this subject, and numerous individuals be excited to search for facts, whether to sustain or to oppose my views, the arrangement and presentation of such facts will serve as materials, which are now almost totally wanting, and will enable this all-important question to be hereafter properly discussed, and correctly determined.

If there were no hope for relief, there would certainly be no use in exposing or dwelling upon these distresses of our people. But, though nothing yet has been done for relief, nor does it seem to have entered the imagination of our legislators —and though all they have yet done has been to add strength to the evil—still it is my confident opinion, that relief may be furnished for this sorest evil of the land, and furnished easily and profitably; and that it is perfectly within the power of man to dry up the most fruitful sources of malaria, and to bring the whole, or very nearly the whole of Virginia, to a state as healthy as that of any other country in the world. If such a result is indeed attainable, it is worth making every possible exertion for; and nothing will induce the smallest exertion, either by the people or the government, except a full exposure of the enormity of the evil which presses upon the country.

It is not my purpose to attempt to investigate the cause and trace the mode of operation of malaria. Though worthy of every care and labor, as a scientific question, it is one which as yet has entirely baffled every attempt at exposition. But though it is as yet unknown what is the chemical character of this subtle fluid, and what are the precise circumstances under which it is evolved, and what is the manner in which it exerts its baneful influence—still the main and most important points admit of no question. Thus, and in general, all persons, from the most ignorant to the most learned, agree that there is *something* which rises into the atmosphere, in hot weather, from marshy ground and stagnant waters, which tends to produce the common autumnal fevers in those who are much exposed to breathing the air contaminated by this admixture.

Though I speak of malaria as an aëriform fluid, or gaseous product, it is not designed to found my argument upon the truth of that opinion. Though, for convenience, as well as because inclining to the belief, malaria is here spoken of as a material aëriform product; yet, it may be also used as a term to designate the particular *condition of circumstances* produced by certain causes, which condition operates to produce and strengthen autumnal diseases. Still less do I mean to maintain that malaria, even if material, is of any one kind of gas, or any particular combination of several kinds. Besides these, there are many other common points on which the learned investigators of malaria totally disagree; and so much does each one insist upon deducing general principles from his own particular facts, (or supposed facts,) and so slightly and incorrectly have such facts been observed, that the general reader becomes lost in the contradictory positions of different instructers. Thus, judging from particular and isolated observations, with some writers, there is no condition of circumstances, which will not sometimes, in a warm climate, produce malaria; and with others, upon equally partial and imperfect observation of other facts, the production is denied to be usually caused by any of the circumstances which are generally deemed the most certain and fruitful sources. One writer, perhaps, has known an exemption from disease in those who lived close to a stinking marsh, or a stagnant pond; and hence he denies that these are sources of malaria, and accordingly searches for them in other circumstances. Another has known the effects of malaria on troops encamped in a high defile in the mountains of Spain, where the soil was dry and stony, and no water except rapidly flowing rivulets, and the place some miles distant from the nearest marsh or lake. Hence he concludes, that even such a locality as this, in certain (unknown) circumstances, throws out abundance of malaria. Considering the circumstances under which most of the works on malaria have been written, it would be strange if they were not quite contradictory. The authors of most of them were army-surgeons and physicians, who observed the effects of malaria, in some deadly region, upon soldiers not at all acclimated. Perhaps the author was confined to a garrison, or at least limited in his observations to the line of march of an invading army; and in a country to which he was totally a stranger, and among a hostile people, whose opinions he could not learn, and whose language he probably did not understand. If a physician of Lord Cornwallis' army, who had merely accompanied his march through Virginia, and been cooped up in Yorktown during the siege, had written a treatise on the diseases of the country, he would have been better prepared to treat of them than most of those who have essayed such tasks; and he probably would have considered as a regular disease of the country the fatal "jail-fever," which swept off in numbers the absconding slaves who had joined the British army, and were crowded together in Yorktown, until the surrender, and which form of disease has never been known there, before, or since.

All agree that decaying and putrefying vegetable matter is one of the greatest, if not the only source of malaria. Of course, then, in addition to the sufficient abundance of the material, the circumstances most conducive to its putrefaction, must be the most favorable to the production of malaria.

The presence of moisture, a certain degree of heat, and the access of air, are circumstances *essential* to fermentation, and of course to the production of malaria; and neither can take place without the aid of all three of these things. Much moisture would be less favorable than a less quantity; and entire covering by water would, by excluding air, prevent fermentation, and its consequence the formation and escape of malaria.

It is also one of the few settled points, among scientific investigators, that malaria is very light, at least when warmed by the sun; and hence the fact known to many in this country, that those who live on the borders of marshes, and of mill-ponds, sometimes escape all injury from their exhalations, when others, who live on high hills, and at much greater distances from the sources, suffer greatly by the disease produced. Facts of this kind are numerous, and of regular annual occurrence, in Gloucester county. The whole of the wide and very level low-grounds furnish residences very healthy, compared to the tide-water region in general; though intersected in every direction by tide-waters, and though there still remains much swamp land unreclaimed, such as the whole body of low-ground was when in a state of nature. But the high, dry and hilly land, which forms the ridge of the county, is less healthy; and the highly elevated and beautiful sites of mansion-houses overlooking the low-grounds, are universally sickly in autumn.

If all the facts in regard to the action of malaria, were as regular and uniform as this one, just stated, is in Gloucester, there would be far less doubt on the subject. It is the uniform character of the country, in its high-land, low-ground, and also the water, and the long extent of each, which causes these effects to be so uniform there. Owing to causes stated in the description of the low-grounds of Gloucester, (page 178,) there is but little malaria evolved there; and if that, as supposed, rises by its greater levity, the regular daily sea-breeze must cause it to float towards the high-lands; and the long and regular line of ridge cannot fail to receive it, and in not very different proportions. But in most other situations, even though malaria should be produced in great quantity and with direful effects, yet these effects are so extremely irregular, in the places, the times, and the intensity of their operation, that they cannot be certainly traced to their true source; and therefore, that source may remain scarcely suspected, while it is dealing out death somewhere in almost every season. Away from the vicinity of the sea, nothing can be more irregular than the winds; yet, supposing a mill-pond to produce a regular and large supply of malaria every autumn, (though that supply is itself extremely irregular,) it depends upon the direction, force, and continuance of every change of wind, whether and where, and to what extent, the malaria will produce disease. It is therefore not at all strange, nor opposed, as is thought by some, to the regular annual production of malaria or causes of sickness, by each mill-pond, that the visitations of sickness, at any one place, should be very irregular, and the difference be often totally inexplicable from any known causes, or variation of circumstances.

According to the views presented, there must be more or less malaria (or the gaseous products which, under certain conditions, form malaria,) evolved in every country where there is much vegetable matter to ferment, and sufficient warmth of climate to carry on fermentation. But, in the small quantity which is unavoidably extricated in every such temperate and fertile country, these products seem to be harmless. Perhaps a small quantity is absorbed as food by growing plants, and this aids the production of the earth. If so, this beneficial operation is made easy by another quality of malaria, which is well established as true. This is, that though it is so expanded by the sun as to rise above the lower air, still it remains on the surface of the earth in the night, after being extricated, or perhaps descends again from above, when condensed by the cold night-air, and of course lies in contact, through the night, with growing plants. Hence it is, that sleeping on the ground, or in the lowest apartments, and being exposed to the night-air, invites the attacks, and increases the virulence of malaria; and hence also it is, that the keeping of fires at night, even in warm weather, has been found highly useful to health, in places much subject to autumnal fevers.

Though it may then be theoretically true that every good soil, in every agreeable climate, is throwing out malaria to a certain extent, it is only large quantities that are hurtful; and in practice, we have only, if possible, to avoid the formation of the hurtful excess of the products of fermentation. If, in lower Virginia, we can guard against the existing and increasing excess of malaria, our situation would be one of the healthiest in the world. For while we are comparatively free from the many and fatal disorders of the lungs to which the inhabitants of northern, and what are usually and improperly called *healthy* countries, are peculiarly subject, we have no source of disease peculiar to our location, save this one, which I fully believe, it is within our power to guard against.

Putrefying animal matter, alone, however offensive in scent, is supposed not to produce malaria. It cannot be doubted but that decomposing vegetable matter is its source, because there is no production of it where there is no such material. Still, vegetable matter, alone, or even when mixed with some putrescent animal matter, does not seem generally to produce malaria in great quantity, or with manifestly injurious effects on health. Thus, the gradual fermentation and rotting of the litter in cattle-yards, when left to stand through summer and autumn—or when the same was heaped and so left, (as was formerly the general practice in lower Virginia on all farms where manure was an object of care—) never was known to be certainly and highly injurious to the residents on the farm. Doubtless, malaria, and to an injurious extent, was always thus produced; but I have never known a sensible difference in regard to health, in years when either of the practices above-named were pursued, and when the material was carried out and applied to the fields in the spring, before fermenting. Yet, if judged by the test of some of the causes and effects as described and reasoned from by writers on malaria, one well-filled yard of litter, rotting through summer, ought to have produced enough malaria to kill half the inhabitants of the farm; and effects, in general, which would have been so disastrous, and so sure, as to leave no doubt of the cause of the evils, and of the absolute necessity of preventing the recurrence in future.

But the putrefaction of vegetable matter, mixed with other things, as earth and water, and under peculiar circumstances, (though neither the precise admixture nor the circumstances are known,) produces disease to such extent, that there is no doubting or mistaking the connexion of causes and effects. Such sure and abundant sources of malaria are the

following materials. 1st, The putrid and stinking water of stagnant ponds, partially dried by the heat of summer. 2d, The mud bottoms of such ponds, or of streams reduced by drought, rich in decomposed vegetable matter, and left bare of water only in summer. 3d, Fresh-water marshes, of vegetable soil, frequently, but not regularly, covered by the tides. 4th, Fresh-water marshes, laid dry by embankments, and thereby permitted to rot away rapidly. 5th, The meeting of salt and fresh waters on land full of vegetable matter. Of these several and most important sources of malaria, I deem the third (fresh-water marshes in their natural state) to be the least hurtful; and that the sources numbered 1st, 2d, 4th, and 5th, increase in virulence in the order in which they are named. The greater evils produced by the last are universally admitted, but still by an erroneous deduction from the premises. The belt of the tide-water region of Virginia, in which the fresh water flowing down the rivers mingles with the refluent salt water from the ocean, is well known to be more subject to autumnal diseases, than any other extensive space in the country. The breadth of this belt varies much in different seasons. The parts of the rivers in which the fresh and salt waters meet, and where each alternately has possession, as the tide ebbs or flows, may be but a few miles wide, and even that space is not stationary. But if the limits of this belt be fixed by the highest points to which the rivers have been known to be brackish, in driest summers, and by the lowest points where they are fresh in winter, then this belt may be considered for the time as 40 or 50 miles wide, and, in length, stretching across all the tide-waters of the state. But in the much narrower space where this mingling of the salt and fresh waters usually takes place during the heat of summer, malaria acts with most intensity. Hence the general opinion, that it is simply the meeting and mingling of the fresh and salt waters which cause disease. This is not so, or but in a very slight degree. It is either the passage of fresh-water over salt-water marshes, or of salt-water over fresh-water marshes, that causes the great production of malaria, and disease. This is an important distinction, and the truth or error of the position deserves the most careful investigation. If the mere mingling of the waters were the cause of sickliness, any relief for this part of the evil would be hopeless, as the waters *must* meet and mix together, *somewhere*. But if it be as I suppose, the evil may be greatly restrained by works of art, or by simply preventing the unnatural accumulation of vast reservoirs of fresh water in mill-ponds, which when discharged, by breaches in the dams, or by opening the flood-gates, overflow salt-marshes, which the natural or unobstructed stream never could have covered.

Salt-water marshes, not touched by fresh-water streams, are not unhealthy to any considerable extent. This is susceptible of proof by innumerable examples in Virginia on the borders of the ocean, or of the waters of the Chesapeake bay. It is rare, however, to find a large salt-marsh attached to extensive high-land, which is not reached by some small stream; and every salt-marsh of course must sometimes be well washed and freshened by the heaviest falls of rain. Therefore all must, slightly and at some times, be prejudicial to health. These, however, are exceptions of but small practical or sensible operation.

The view here taken of the manner in which malaria is produced most certainly, and acts most injuriously, though not sustained by any known authority in this country, nor by any other precisely as stated here, is not therefore presented as original. I derived it, and thence deduced my application to this country in a modified form, from the interesting report on the malaria of Italy by Gaetano Georgini, of which the substance was published in two different papers in the Farmers' Register, (p. 502 of Vol. IV, and 460 of Vol. V.) In this report the author shows by the most conclusive argument and facts, that the irregular irruptions of sea-water over tracts of marshes, or other low-grounds, of fresh-water alluvial formation, caused the long continued and worst effects of malaria; and that by simply guarding against the entrance of sea-water, the country was restored permanently to healthiness. He says nothing of the reverse operation, the irregular floodings, with fresh-water, of salt-marshes. But what is produced by the one, can scarcely fail to be as well produced in the other case. The *mode* in which the effect is produced is not attempted to be explained by the learned author quoted above; nor does any explanation seem sufficient to my mind. The rapid and abundant production of malaria may perhaps be aided, if not entirely caused, by the luxuriant cover of fresh-water plants, in the one case, being partly killed, and made ready for putrefaction, by being covered by salt water; and in the other case, in this country, by a like injurious operation on the plants peculiar to salt marshes, produced by the overflowing of fresh water. We know that certain plants flourish best in salt and wet soil, as others do in wet soil entirely free from salt; and that respectively with these different growths, the salt and the fresh marshes are heavily covered. It must follow from a sudden change in the condition, from salt to fresh, or the reverse, that the health of the entire growth must be greatly injured, and much of it subjected to death and decay.

The next most fertile source of malaria, (or perhaps what is even of greater malignity, for the small space occupied,) is presented in what is entirely the work of man—the miscalled *improvements* made by embanking and partially or entirely drying tide-marshes. The soils of these marshes, as I have ascertained by careful analyses, are composed, for about half their weight of vegetable matter, and probably nine-tenths of their bulk is of that material, destructible by decomposition, when circumstances are favorable to that result; and drainage and cultivation produce precisely the condition which is most favorable. When covered twice every day by flood-tide, a marsh soil of this kind, though composed of the most putrescent materials, is but little subject to decomposition; because being always thoroughly water-soaked, even when not entirely covered, and by water continually changed, the air is too much excluded, and the wetness is too much in excess, to favor the progress of decomposition. When the marsh rises so high as not to be covered by the daily or frequent tides, then decomposition is more favored by the drier state of the surface, and to a greater extent, malaria is evolved, and health injured. Hence the inference, that the higher and the drier the marsh, the more it is injurious to health. But as soon as such a vege-

table and putrescent soil is made nearly dry, and still more when cultivated and exposed to be penetrated by the air, decomposition proceeds under the most favorable circumstances. The soil sinks annually and rapidly, not so much by drying (as commonly supposed,) as by actually rotting away; and in a few years, it is reduced to so low a level, as again necessarily to pass under the dominion and shelter of the water. The more complete the drainage, and the more perfect the management as arable or tilled land, the more rapidly is that end reached. In the progress to this end, a layer of the whole soil, of from one to three feet in thickness, will have passed off into the air in the gaseous products of putrefaction, of which enormous products, a large proportion will be malaria, and the effects produced by it on the health of some of the neighboring population are generally so evident as to leave no doubt of the source of the evil. More full details on the effects of embankments of tide-marshes are to be found in previous articles in this work.*

The production of malaria by the last named operation, the embanking of marshes, however, is necessarily of very limited extent—and moreover of very limited duration. Nature soon asserts and enforces her rights; and the hopes of the improver, and the land so improved, are together overwhelmed by the reinstatement of the waters, and this source of disease is thereby cut off.

Tide-marshes, however extensive and injurious in their operation on health, still are limited to a comparatively small proportion of our broad territory. But there is another source which spreads disease over half the state, and which is entirely of artificial formation, and of which the evil effects have been becoming more and more extensive, and more and more virulent, from the early settlements of the country to this time. This widespread and generally operating source of disease and death is furnished by the numerous mill-ponds, of variable height of surface, which are now scattered over the whole face of eastern Virginia, and of which every individual case adds something to the general and enormous amount of injury to health and to life.

The law of Virginia in regard to the erection of mill-ponds, with perhaps the exception of the fence-law, is one of the most stupid, and most regardless both of private rights and general interests, of all in our code; and it is far more objectionable than the former, inasmuch as while the one merely robs private and destroys public wealth to an enormous amount, the mill-law permits and encourages also the destruction of health and of life throughout the whole land. It is true, unfortunately, that this opinion is not entertained by but few persons: and that even with those who admit that all such mill-ponds are injurious to some extent, their estimate of the amount of evil is much below mine. It is my object, to awaken the community to a sense of the enormity of the evil, and thereby to induce the commencement of measures of remedy and prevention. The universal acquiescence in this policy of our country, and the almost universal ignorance of the evils which it produces, requires strong language to enforce novel views in opposition to long established opinions. But it is confidently believed that my denunciations will be justified by reason and by facts, and by the magnitude of the existing evils.

There has long prevailed in Virginia a mania for building water-mills, which was not restrained by insufficient regular supplies of water to fill the ponds, nor by the insufficient prospect of business and of profit, even if there were no failure of water. In consequence, there have been not only erected mills on every stream barely sufficient to keep a common corn-mill in operation, but also on as many others where the water-power was either insufficient, or totally failed, during the driest season of every year. In the tide-water region, the mills for grinding wheat-flour, or anything else for sale abroad, are limited to the falls of the large rivers. All the others, (and probably there is on average one for every square of five miles,) are merely designed to grind for toll the corn used for bread in the immediate neighborhood; and, considered merely in regard to money-cost and profit, it is most likely that half the mills in the country do not get enough toll-corn to pay for more that the costs of maintenance and repairs of their establishment. The more worthless the mill, on account of the insufficient supply of water, the more productive it necessarily is of malaria, diseases, and death. It will be difficult for me to make those who are unacquainted with our country believe that hundreds of mills have been built, and that most of them are still kept up, and many more new ones will probably yet be added to the number, which cannot yield any clear profit, above the entire cost, to the owners, independent of cost in property to the neighbors, and the cost (whatever that may be) of health and life to the country at large. Still the fact is notorious throughout lower Virginia, if it does not extend through the higher middle country. The only reason that I can conceive for so many unprofitable investments of this kind, is, that many residents of the country build mills, as many others raise race-horses, more for amusement and excitement, and to vary the monotony of their lives, than for profit. But this propensity of individuals could not have done much mischief to the country at large, but for the encouragement offered by the government. According to the law, and the long-established usage under the law, any man who desires to erect a mill, and for which it is necessary to pond the water on some of his neighbors' land, has nothing to do but to apply for an order of the county-court, by which the sheriff summons a jury to meet on the spot, to judge of, and assess the damages that will be sustained by the owners of the lands designed to be covered by the pond. The jury is generally composed principally of men as ignorant and unfit for such investigations and estimates as the neighborhood can furnish—and they decide by guess as to how much land will be covered, and what damage will be sustained in the loss of the use of the land. There is no question entertained as to whether a mill is at all required by the demand of the neighbors for meal; and if the question of the effect on health is even named, it is addressed to a body entirely unacquainted with, and regardless of the whole subject. In fact the question as to health has rarely been considered in any such cases; and never duly considered. If the land

* See Farmers' Register, p. 107, and 129, Vol. I. and p. 41, 42, Vol. V.

that will be covered by a pond, though very rich, is then in the state of swamp, and totally unproductive, such an uninformed jury, as the case is usually submitted to, will be very ready to decide that such land is worth nothing; and if $3 an acre is given as damages, for the land actually to be covered by the pond, it will be deemed a liberal allowance. The court will rarely refuse to sustain the verdict of the jury.

Though the use of the land thus covered is forever taken from the owner, or, for as long as the mill-owner may choose to keep up his pond, still the right of property is not changed. This small reservation of right, or feeble homage to justice, serves as a still further injury to the community, and is not of the least value to those to whom the right is reserved. It would be far better for all parties, if, when land was thus condemned to be covered by a mill-pond, that the damages assessed, however low and pitiful compared to the damages actually sustained, should have been deemed the purchase-money of the land, and the absolute right of property vested in the mill-owner. If this were the case now, there are many mill-ponds in Virginia which would be forthwith laid dry, even though the mills should necessarily go down; because the land covered by the ponds is now known to be worth more for cultivation than the mill is for toll. Hundreds of other mills, of greater profit and value, also, in that case, would be better supplied with water by canals than by their present ponds, by which their value as mills would be increased, to the owners and to the public, and the nuisances of the ponds be equally abated. But as the law now stands, if a mill, which will not bring in of net rent $50 a year, covers by its pond 500 acres of rich land belonging to other persons, the mill-owner has no interest whatever in draining the pond, because its drained bottom would belong to other persons. In any case approaching to this, and in which there would be a gain to all the individuals concerned, by draining the pond, still it is not done, and the nuisance continues long after it is well known to be such, because there is a contest between the several owners of the pond and of the land covered by it, in regard to their respective shares of profit to be gained by emptying the pond. Many such cases still exist in Virginia; although many of the most unprofitable ponds, from proper views of economy, have been drained, and either substituted by cheaper and more efficient canals, or the mills put down entirely. An old mill-pond in Dinwiddie county, which covered 1200 acres of land, has been drawn off, and thereby an indifferent mill exchanged for a large fertile farm. This would not have been done, even if the mill was worthless, but for the ownership of the mill, and the land covered by the pond, falling into the same hands. There is a mill-pond now kept up in Prince George county, which is supposed to cover nearly 400 acres of land; and there are many others not much smaller, on different branches of swamps in lower Virginia. The larger the pond, in general, the greater proportion of bottom is left dry in autumn, and the more disease is therefore produced; and though the draining of such large ponds would be so much the more an object of gain, there is the less chance for its being done, because of the separate ownerships and interests.

Almost all the mills throughout the lower part of Virginia, and also a large proportion of those in the more hilly middle country, are worked by streams which are inadequate to the daily supply of the mill, and evaporation from the pond, even if the grinding is not necessarily suspended or diminished at any time. To guard against the temporary failure in dry weather, the full "head" of the pond, (or the level of water for which damages were assessed, and to which the water may lawfully be raised,) is much higher than the lowest level that will work the mill. The land covered is also usually very nearly level, so that to raise the water 10 or 15 feet at the dam, will often back the water from one to two miles up the low-grounds. If the variation between a full head of water, and the lowest level, be 5 feet perpendicular, it will often cause the uncovering of many acres of the bottom of the pond to the hot sun, and thereby furnish a most fruitful source of malaria in every such case. Rich alluvial mud, as this always is, thus exposed, in hot weather cannot be otherwise than very injurious to health; and there is not a pond-mill in Virginia, with a variable head, which has not more or less of the pond every summer thus converted to a fruitful seed-bed and nursery of disease.

Besides this, there is the not rare occurrence of the pond being entirely drawn off in summer, by the breaking of the dam, and suffered so to remain for weeks or months, before being again repaired and filled. In this case, a double quantity of bottom is exposed to putrefaction, and fitted for the discharge of unhealthy miasma.

At all times, in ponds supplied by streams as feeble as most of those used for mills in Virginia, the water approaches to a stagnant state; and therefore, of itself is a producer of malaria. In dry seasons, when unusually low, the putridity of the water of such ponds is perceptible to the sense of smell; and it must be then far from harmless.

Another, and in certain situations, the greatest evil of mill-ponds, remains to be stated. The others above-mentioned are the effects of the scarcity of the supply of water; this is from the excess, which is found in all streams, at some times, even though the most deficient at others.

To guard as much as possible against the expected scarcity of water, the mill-owner aims to hold, when rains increase the usual supply, as "full a head" as he has a right to maintain. When this supply is exceeded, as it frequently is, and greatly, if the dam is not actually broken, and the whole emptied, in one prodigious flood, at least the flood-gates are opened widely, and a discharge made ten-fold greater than would have occurred, during equal time, if the stream had not been obstructed by a dam, and had discharged as regularly as the supply was increased. It will be evident, on considering these circumstances, that water from a mill-pond, whether discharged by flood-gates, or otherwise, must be far more variable in height, and in extent of inundation on the land below, than the natural stream, unobstructed by art; and still more than the stream opened and improved, and its course facilitated by art. An ordinary natural stream, which might have a very uniform discharge in dry weather, and would rarely overflow its banks in wet, if dammed across for a mill, would often have its bed, below the dam, left almost dry; and at rare and irregular times, would be converted to a tremendous flood,

which would sweep over many hundreds of acres more than the floods of the natural stream could have reached. Besides the immense damage caused to cultivated land by these floods, (and which kind of damage is rarely estimated or thought of by juries, when mills are established above,) there are numerous hollows made, and filled with water, which, on the retreat of the flood, (as hasty as its inroad,) remain so many stagnant pools, until made dry by evaporation. The whole land, thus covered, is saturated with water; and, from the nature of the rich alluvial soil, is throughout, as it dries, made a producer of malaria.

But the worst part of this evil, by far, is when these artificial floods of fresh-water pass over salt-marshes—which happens in all the country in which the fresh and salt waters meet; and this combination of causes I consider the most efficient producer of disease in that part of the country, and the thing which ought most especially to be guarded against. According to the views before presented, the passage of fresh water over salt-marshes, no matter to what extent, is one of the most sure producers of malaria, and of a particularly malignant kind. The mill-ponds, alone, form other and far more extensive, if weaker sources of the poison; and by the union of the two, the mill-ponds exert all their usual bad influence above the dams, and spread ten-fold more pestilential effects below, by inundating the wide salt-marshes, which by natural streams would scarcely have been affected.

On Nansemond river there are lands already rich, and having inexhaustible supplies of the best marl, which have been sold at $10 the acre. There are hundreds of estates in the same belt of country, which cannot be sold for as much as the cost and present value of the buildings. And this otherwise fine country, so accursed by disease, owes its condition principally to the streams which flow into the salt tide-waters, and which are so numerous, and their sources so interlocked, that there is no spot safe, by remoteness of position, from these combined effects of mill-ponds and salt-marshes. It is therefore sufficiently evident why that otherwise finest part of the state, for agricultural improvement and profit, should stand among the lowest in both these respects. Yet this part of Virginia might be rendered both healthful and fruitful, and the delightful region which God has permitted it to be made, if man would accept and avail of his bounties, by merely using half the expense for improving, which has been lavished to inflict pestilence and poverty on the country.

These statements and expressions of opinion will be unpalatable, if not offensive; and perhaps may subject the writer to the charge of being willing to injure the residents of the region for whose relief in this respect he is most anxious, and of the facility and cheapness of obtaining relief, by the use of proper means, he feels most confident. If the exposure and probing of the ulcer be never so painful, let it be remembered that it is done solely for the purpose of seeking for, and applying, a sure remedy.

There is still another source of malaria, which it is necessary to touch on in connexion with the above-mentioned, though it has been already treated more fully elsewhere, and therefore will be but slightly mentioned here.*

From the vegetable matter upon the driest land, as it ferments and decays, there must be extricated more or less of the gaseous matter, which, when in excess, is injurious to health. According to this view, the whole surface of the country, and especially that most heavily covered with vegetable matter, may furnish malaria. The degree of hurtfulness of this product will depend on the power of growing vegetables to feed on, and of the soil to absorb and fix in it, this matter, which, according to its direction and quantity, may either enrich land, feed plants, or poison men. In earlier publications I have stated at large my reasons for believing that all the products of vegetable decomposition, on naturally poor lands, are lost to the land;† and as the ultimate results of decomposition are gaseous, or aëriform, they must go off into the air. These products constitute or cause malaria, and its injurious effects on the health of the inhabitants. But calcareous matter serves effectually to fix there the enriching principles of decaying vegetable matter, until they become the food of growing plants. Hence the deduction that a naturally poor soil, made calcareous, will no longer throw off gaseous products, or malaria, into the air; but will store it up as fertilizing manure. The sure remedy for the irregular and generally slight degree of sickliness thus caused, is, to marl or lime all the land that requires calcareous earth. But that remedy would not be sufficient, if mill-ponds or marshes in the neighborhood continued to send out large additional supplies of the aëriform poison.†

The correctness of my deductions as to the very injurious effects of mill-ponds on health, will be denied on several grounds, which, so far as expected, I will anticipate as objections, and state with the answers, as follows:

Objection 1. Admitting generally, and to some extent, the ill effects of mill-ponds in producing noxious exhalations, and autumnal diseases, it does not appear, that these effects can be either so great, or so sure, as is charged above. The residents on the farms nearest to mill-ponds are not always, and often not at all, more sickly than those who reside several miles distant. The house of the slave who acts as miller, is usually near the mill, and close to the pond; yet families so situated are generally as healthy as any others, and sometimes are healthy in a remarkable degree, compared to the neighborhood generally.

Answer. Near the mill-dam, or the lower end of the pond, may well be less affected by the exhalations from it, than places a mile or two more distant. That part is the deepest of the pond, and of which also the banks are steepest; and perhaps half a mile in length of the bottom of the upper and shallowest part of the pond, and of alluvial mud, might be left naked in drought, before a margin of steep hill-side, of three feet width, could be exposed near the mill. Further—from the greater lightness of the malaria, it will rise high in the air, and would soon be carried far away by a moderate breeze. If the wind be moderate, and steady to

* See "Essay on Calcareous Manures," 2d ed., chap. xix., and "Essay on the Police of Health," commencing p. 154, Vol. V. of Farmers' Register.

† Essay on Calc. Man., ch. iii., viii., and xii.

one direction, and still more if its course be confined to an opening by or between woods, or to a narrow valley between high hills, it may well be imagined that the poisonous air might injuriously affect persons perhaps five miles from the pond, and who would not suspect the operation of so distant a source; while others, close to its border, but in a different direction, or on a different level, might escape its influence.

Objection 2.—There is not enough difference in the usual or average healthiness of families the most exposed, and others the least exposed to mill-ponds, to attribute much of the effects to these causes. Whole neighborhoods, in some autumns, are very healthy, and in others very sickly, without either condition seeming to be connected with any certain and known state of the nearest mill-ponds.

Answer.—The extreme lightness of the poisonous air, and great and frequent variations in the direction, force, and continuance of the winds on which it is borne, make it generally impossible for it to be known from which particular pond or ponds the malaria rises, or where it is carried. It is most probable that the exhalations of twenty ponds, of which the most remote may be thirty miles apart, may be mingled together, even by the winds of a single day, and thus combine and average the effects of all. Further—if all the mill-ponds of a county furnish one half of the active and injurious malaria, and the other half is thrown off, nearly equally, by the whole surface of the land, (though some parts would receive the strongest doses, and others escape with having only the weakest,) it would be impossible to understand the mode, and estimate the intensity, of operation of the known general causes; or to refer, with certainty, any one effect to its special or principal cause. Thus, a farm, relieved from all malaria of its own product, by marling and by drying its mill-pond, though evidently showing the benefit in increased general healthiness, might still be sorely visited by the seeds of disease from other and remote sources, directed and concentrated by a steady wind.

Having presented these views of the origin, action and effects of malaria in this country, I can better exhibit the progress of the causes which I believe to have operated, and which are still continuing to operate, to produce the change from a healthy, to an unhealthy state.

When our ancestors first reached this shore, nearly the whole country was in a state of nature. The savages had cleared for cultivation but a few fertile spots on the banks of the rivers; all the rest of the land was under one great forest. The streams had not been obstructed by the cutting down of trees across their beds, (by which, in many cases, streams have since been choked, and swamps thereby formed, or greatly extended.) No dams had obstructed the free and regular course of the streams, and therefore no great artificial floods were formed. The soil not having been cultivated, was not exposed to be washed away by the rains into the rivers. The waters therefore were generally clear, instead of being generally muddy, as since all these circumstances have been changed. In this former state of things there could have been existing but few sources of malaria.

The first sources formed by the civilized settlers, was in making ponds to supply water-mills. But while these were yet few in number, the constructers of course chose the best and most unfailing streams; and the ponds were also, for a long time, surrounded by dense and tall forests. Such hilly land as the margins of the ponds would certainly not be brought into cultivation, while so much that was far better, and easier to till, remained unoccupied. Hence, such ponds produced but little malaria, and that little was warded off from the settlers, or taken up, by the forest growth. The general wooded state of the country, also, for a long time, rendered the supplies of water more regular, and prevented the severe droughts, which would have altered greatly, as is usual now, the levels of the ponds.

The clearing, cultivation, and consequent washing of the lands of the upper country, greatly increased the muddiness, and quantity of alluvial deposite of the rivers, and thereby increased the marshes both in breadth and in height. More mills continued to be built, and on streams worse and worse for water-power, as the choice became less open, and the mill-mania began to grow; and, in the general, each successive construction of a pond was less productive of profit, and more productive of disease, than its predecessors. The number of mills not only continued to increase, and is increasing to this day, and in the oldest settled parts of this state, as well as the newest, but gradual changes also took place in the condition of the old mills which greatly increased their fitness to produce disease. By the long continued deposite of mud from the streams, and the washing of the now cleared and tilled hill-sides, the ponds became more shallow, and the waste of water by evaporation therefore became greater; while the supply was lessened, in consequence of the extended clearings of the great forest which had before covered the whole country. To remedy the increasing deficiency of water, the owners of old mills, who were not prohibited by circumstances, raised the level of their ponds; which by increasing their surface and their contents, still more increased the daily evaporation, and also the violence of floods, and the variable height and surface of the water; all of which again combined to increase, still more than before, the product of malaria. The consideration of the progress of all these circumstances, and their bearing on each other, will serve to explain why a particular neighborhood might formerly have been healthy, though having two or three mill-ponds within or around it; and why it might gradually have become very unhealthy, in the course of time, by the malaria produced by the ponds of the same mills, or perhaps by the addition of one more new pond, to the former number. But, in such cases, so gradual would be the general change, and so irregular and variable the attacks and virulence of the autumnal diseases, that the sufferers would not attribute the change, (even if they admitted it to have taken place,) in their average degree of health, to causes which had so long existed, without being charged with doing mischief; and in which causes, no change of condition had been observed. Add to this, that self-love makes every man reluctant to believe, and to confess, that his own farm, or his own neighborhood, has become more sickly; and the change for the worse is attributed to transient causes, until the former state of

things is almost forgotten, and the present is received as if it had always been the usual condition of circumstances.

During all this time, other causes were working to produce other nurseries of disease, and impediments to agricultural products and improvement. The wet alluvial bottom-lands, bordering on small rivers and still smaller streams, were for a long time neglected, and deemed of little value, except for their fine white-oak, cypress, and other noble timber trees. These were cut down so as to fall into or across the streams, when in reach, more often than otherwise; and in consequence of such obstructions, continually increased in number for more than a century, the before open streams were choked, and the bordering low-grounds converted to swamps; and those which had been swampy at first, were made still more so, by obstructing the sluggish streams and spreading them over the whole surface, and causing that surface continually to rise, by fallen trees and alluvion. But wet as are such swamps for the greater part of the year, most of the surface is dry in autumn; and the scanty water is then stagnant in numerous pools, until added to by the first heavy rain, or a flood from a mill-pond discharged above. Of course all these circumstances added enormously to the previous annual decomposition of vegetable matter, and consequent production of malaria. Such swamps as these, formed by nature and increased by art, are those on the Chickahominy, Blackwater, and many other long but gentle streams. To form or increase their evil qualities and tendencies the law has given full permission, and no small aid; but it positively, though indirectly, *forbids the drainage* of all such extensive swamps, and preserves them still as mere nurseries of disease. A general law for permitting and facilitating, under proper regulations, the draining of these great swamps, would be a measure which would be most beneficial, not only for improving the healthiness, but for increasing the agricultural products of the country.

But though the tendency of the general changes in the physical condition of the country was to increase the causes of autumnal diseases, there were numerous particular exceptions, in works serving to promote health. Of this kind were the opening and straightening of the choked channels of small rivers, and many large streams, in the hilly country, where there was enough descent to enable each individual proprietor of flooded low-ground, to relieve it by operations confined to his own land. The effectual drainage of much land of this kind has produced so much benefit to health, as, in many cases, to balance, and even exceed, the increasing pestiferous effects of the neighboring mill-ponds. Such facts would be taken, by most persons, as proofs that the increase of mill-ponds had not increased disease.

Such benefits have been produced by the gradual draining of the extensive low-ground of Gloucester, which in its former and natural swampy state, must, necessarily, have been an abundant source of malaria. This change, together with other circumstances stated in the recent description of that part of the country, has operated to render the Gloucester as free from bilious disorders as any part of the tide-water region—save the adjoining county of Matthews.* The remarkable general state of healthiness of all these very low lands, at present, as well as the exceptions, and evident causes of the exceptions, furnish the most clear and important evidence of the truth of the position, that mill-ponds, and floods of fresh-water discharged over salt-marshes, are the great sources of malaria in Virginia. As stated formerly,† there are but few fresh-water streams discharged on salt-marshes in these two counties, and not a pond-mill on the low-grounds, nor indeed in the whole county of Matthews, save one on its border nearest the high-land. The facts presented here, alone, will prove the great and certain benefit to be obtained by even a partial and imperfect avoidance of the action, separate and combined, of these two great sources of malaria.

The most important part of this subject is the consideration of the remedies for the evils described. But although the means available for this end, in my opinion, are ready, cheap, and sure, still it is needless at present to argue in their favor at great length. Unless the people are aroused to a proper sense of the evils under which the country suffers, no regard will be paid to the consideration of proper remedies; and if the former object can be gained, the latter will then necessarily follow.

The most important of these remedies, and of which the proper use, I maintain, will remove nearly all the existing sources of malaria, and make lower and middle Virginia in general as healthy as any region of the earth—will be merely here stated concisely but distinctly.

1st. To prevent the continuance of any mill-ponds of very uncertain supply, and variable "head," or height of water.

2d. To furnish to the land-floods, of streams swollen by rains, or by any mill-ponds still left, the quickest and best possible discharge to tide-water by open canals, so as to prevent the fresh-waters passing over any salt-marshes.

3d. To drain the great flat swamps; all of which require a continued canal to be extended from the lowest out-let, up to the head of the supply of water, in the most effective course, and on a general plan, through the lands of many different proprietors. The drainage of lands, so situated, is effectually forbidden by the existing laws; as there is no power to act, unless all the proprietors concur in every particular of the execution and expense of the drainage; which is obviously impossible.

4th. To refrain from embanking from the tide any marshes of the usual putrescent and perishable soil.

5th. To apply marl or lime to all lands needing calcareous manures, and on which they could be furnished at not too great cost for even such great improvement of soil and product, as would certainly be obtained in such cases.

The two last means of prevention are altogether within the province of individuals, and will be used, or not, according to the views of different individuals, as to the agricultural profit to be expected from such operations.

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* See the facts and reasons stated more fully at p. 179 and 190, in the last number of Farmers' Register.

† The same, p. 190.

The three first-named means of remedy would each require the action of the legislature, to enable them to be used to any extent.

The necessity for a general plan being authorized by law for inducing and compelling combined operations to drain swamps on long and sluggish streams, though merely for agricultural improvement and profit, is already evident to most intelligent farmers; and perhaps nothing is now wanting to procure such legislation, but the proper exertion of some of the individuals who are most interested on the subject.*

The giving free vent to land-floods, also, by wide and straight canals, and preventing them, by dikes, from overflowing the salt-marshes, though a kind of work requiring public money, as well as legal authority, still may be hoped for, when the necessity of the measure shall have been made evident.

But there is no such prospect of success as to the most important reform needed, in the putting down of all fever-breeding mill-ponds; and he who will venture to advocate this general measure, will be regarded by most of those whom he aims to serve, as more an enemy than friend to their interests, and more deserving to be treated as a lunatic, than to be respected as a judicious advocate for valuable public improvements. It is not in the vain hope of now enforcing my views by extended argument, but to offer explanations, and thereby prevent misconstruction, on some particular points, that some further remarks will now be offered.

Even if the public mind had been prepared for a full legal reformation of the police of mill-ponds, and for the laying dry all such as are nuisances to health, there would be no accompanying necessity for injuring the private interests of mill-owners, nor of causing material loss or inconvenience to the customers of the mills. In the first place, in justice to the vested rights of the millers, (however unjust to others, and injurious to the public may have been the original creation of their rights,) I would advocate full compensation being made for every sacrifice of value in their ponds, which should be required and compelled for the general benefit. But *not more* than full compensation for all value thus destroyed should be granted; and many of the fever-breeding ponds have really no pecuniary value to their owners or to the public; and most others may, to greater advantage, be supplied with water by canals, instead of by ponds. Even if one-third of all the mills should be thus put down entirely, these would be such as now always fail in dry seasons; and the more permanent and regular supplies of water, which all the remaining mills would receive from the canals substituted for ponds, would render them able to furnish the whole country with meal, with regularity, certainty, and in abundance, and therefore more suitably and conveniently to the consumers, than all the mills, good and bad, now in operation. By an important innovation in the law in regard to mills, (enacted March 2d, 1826,) every owner of a mill is authorized to cut a canal through the lands of other persons, if required by the nature of the locality, so as to substitute the pond by a canal. Before this amendment of the old law, no mill-owner could effect any such improvement, unless in the rare case of his own land extending under the whole course of the desired canal. The privileges offered by this new provision have already been availed of in many cases, in Charlotte, and the neighboring counties, and to great advantage in regard to health as well as to increased power to the mills, and great value gained in the rich drained bottoms of the ponds being put under cultivation. Slow as such lessons are usually learned, and slow as new agricultural improvements are brought into extended use, this highly beneficial and profitable improvement, cannot fail to be adopted generally in the course of time.* The main obstacle to the early and general substitution of canals for ponds, wherever the change is practicable, is the absurd legal distribution of rights in the mill-ponds and the land which they cover, as stated on a preceding page (223); one person being vested with the perpetual right to keep the land overflowed and worthless, while others have the right of property in that land, to be exercised only in the never-expected event of the owner of the pond drawing it off and draining the rich bottom; and that for the gain of others, more than himself. Now I would get rid of this absurd conflict of rights, by vesting the full property in the land covered, in every mill-owner who would draw off the pond; or if he did not avail of the privilege offered, the land should be given up to its former owners, or to any one else, who would construct a canal, and thereby secure to the use of the mill an equally good supply of water-power.

Each of the several remedies proposed and stated above, would alone furnish a fruitful subject for investigation and discussion. But more extended remark from this source, is as yet uncalled for. Other persons, having better practical information, and thereby prepared to confirm or to disprove the positions here assumed, are invited to aid in the discussion. Let the truth be made known, on whichever side it may be found; and should all facts and deductions presented serve to show that the present system greatly needs reformation, and to awaken the public to the importance of the object, then will be the suitable and propitious time to ask attention to remedies proposed for the then acknowledged evils, inflicted by the action or permission of the government. Whenever the legislature is prepared to act decisively on this whole question, there will be before them a subject for the internal improvement of of Virginia, far more important in beneficial results, than the roads and canals which have cost millions of dollars to the treasury; and yet which will be cheaper, compared to the profit to be certainly counted on, than the most humble or contemptible job yet carried through by public expenditure and as a public improvement.

But according to the existing law, any single individual who clearly sustains injury to health from any particular mill-pond, has even now the legal power to have that particular nuisance abated, by means of suit for damages for the injury thereby sustained. It has been judicially settled, that such ground of suit for damages is not prevented by any previous assessment by the first jury, nor by any lapse of time during which the mill has

* See Far. Reg. vol. I., pp. 232, 386, 518, 733, 734.

* See facts and statements on this subject at p. 231, vol. V., pp. 1 to 3.; p. 579, vol. II.; p. 374, vol. IV.

been standing; nor is the ground removed by the new damages awarded for injury already sustained and sued for. No matter how often damages may have been given to the plaintiff by successive verdicts, and paid by the defendant, there will continue ground to sue, and recover, as long as the pond remains, and is hurtful. It is surprising that the law, so favorable to the interests of mill-owners, and regardless of all conflicting interests and rights of other persons, should have permitted, in this particular, so much of remedy for the previous injustice and injury inflicted by the law. And it is still more surprising, that after legal decisions have so clearly shown the remedy, that of so many thousands of individuals who are unquestionably suffering every autumn from the neighborhood of stagnant mill-ponds, so few should have availed themselves of the offered means of relief.

If the importance of this general subject were duly appreciated, its investigation would become an object of the care, and be conducted at the expense of government. If the legislature of Virginia (for example) would institute a "General Board of Health," or "Commission of Sanitary Police," for the purpose of investigating the subject of malaria thoroughly, and of reporting the sources and proper remedies, the body of evidence which would be collected, and the after-results, might be made worth many millions of increased pecuniary value to the state, besides the far greater benefit to be produced to the health, the physical and moral qualities, and the general happiness of the people. At any possible cost of such an investigation, and of the system of measures founded thereon, the public improvement and benefit produced thereby would exceed the expenses an hundred-fold.

CHINESE TREATISE ON RAISING SILK-WORMS.

[We are indebted to the attention of the Hon. John Forsyth, Secretary of State, for a very curious work, which, upon his recommendation, and we may say under his auspices, has recently been translated and published in this country. It is an octavo volume of 169 pages, and 10 plates, published by Peter Force, Washington, February, 1838, and entitled a '*Summary of the principal Chinese Treatises upon the Culture of the Mulberry and the Rearing of Silk-worms.*' The American publisher's note states that—

"This "SUMMARY" was first translated from the Chinese, by Stanislas Julien, member of the French Institute, and professor of Chinese Literature, in the College of France, and printed at the Royal Press, in Paris, by order of the Minister of Public Works, Agriculture and Commerce. The French copy from which this translation was made, was transmitted from Paris, to the SECRETARY OF STATE, and by his recommendation has been translated and published here."

The body of the work consists of numerous extracts from various Chinese works and authors, on the culture of the mulberry, and all the different parts of the management of silk-worms, and the cocoons. The Chinese originals of these extracts, are of various ages, but generally of very ancient date, and some are as old as 4000 years. Independent of any economical value, in the furnishing instruction in unknown and useful practices, this work is a literary curiosity, which cannot fail to be interesting to every general reader who knows any thing of the remarkable peculiarities of the Chinese people. That nation had reached a very high degree of civilization, and of advancement in learning and the ornamental and useful arts, many centuries before any part of the now enlightened portion of the world had emerged from ignorance and barbarism. The Chinese were thousands of years ago but little less advanced in these respects than now; and if they have learned less (as is the case in a very remarkable degree) than any rising people, they have also lost nothing of the acquisitions in knowledge which they possessed thousands of years ago. If, therefore, from their books and their present practices we can learn nothing novel or of late improvement, in China, we may surely count on meeting with instructions and practices approved by the experience gained through many centuries, by the most industrious, careful, and economical people in the world.

But it is not merely to readers of literary or antiquarian taste that this book may be interesting and valuable. There are many particulars of management recommended which are different from any used in Europe or this country; and if, to any of these practices, the Chinese owe their great and peculiar success in rearing silk-worms, and in silk culture generally, then there may be much value gained by adopting some of their methods, novel to us, though perhaps in use twenty or thirty centuries in China. In a late number of the Farmers' Register there was republished the novel information that rice-flour was a useful addition to the food of silk-worms; and this new discovery is found among the very old instructions presented in this Chinese work.

Other and more important differences of practice are exhibited in the manner of giving food to the worms, and especially in the numerous times of feeding, through night as well as day. In regard to other things, we quote the last paragraph of the "Introduction" to the French version, by M. Camille Beauvais, who is one of the highest European authorities on silk culture.

"I should like, in terminating these reflections, to call the attention of the reader to some important points of the Chinese work; for example, upon the manner of making the butterflies lay their eggs, and of preserving the eggs; also, of the means employed to make them hatch at the same time. I will point attention, from the same authority, to the disastrous effects which result from the sudden introduction of cold and damp air in a silk-room, where the temperature is high, as well as the fatal influence which is produced by the fermentation of the leaves, upon the health of the silk-worms. I will add another fact, to give in a few words an idea of the incontestable superiority of the Chinese methods over the European: it is, that *they hardly lose one silk-worm out of a hundred*, while the Europeans *lose fifty out of a hundred.*"

We shall copy from the American version of the Chinese work the part containing instructions for managing the insects, from the egg to the end of the

feeding; and also a part of the "Advertisement" of the French translator, S. Julien. In the last mentioned, our readers will probably find cause for astonishment in the account of the great number of Chinese books on agriculture.—Ed. Far. Reg.]

Extract from the Advertisement of the Translator.

A stranger to the *sérigène* industry, and to the science of agriculture, it does not belong to me, above all, after the introduction of M. Camille Beauvais, to speak of the practical advantages which the Chinese work offers, and of which I now publish the translation.

I will only present to the reader some details, purely literary, of which, some will not, perhaps, be uninteresting. The Chinese, whose literature is the richest in the world, possesses many hundred works upon agriculture, which, among us, always comprises the *raising of silk-worms and the cultivation of mulberry trees.* They have also particular treatises, such as the *Tsan-chou*, the *Tsan-king* (books on silk-worms); the *Nan-fang-tsan-chou*, methods used in the south; the *Pé-fang-tsan-chou*, methods used in the north of China, the *I-sang-tsong-lun*, general considerations upon the cultivation of mulberry trees, etc. But among the twelve thousand Chinese volumes which the Royal Library possesses, there are but three works which treat in a manner more or less extensive of the double question which occupies us. The first is a small Encyclopædia of the Arts and Trades, in 3 volumes, 8vo., entitled *Thien-kong-khaï-we*, of which the second edition has appeared in 1636. Brief proceedings are found there, which competent persons have thought very interesting. I have given them the greater part in the Supplement, (page 187–169.) The second work is found in an agricultural collection of sixty books, entitled *Nong-tching-tsiouen-chou.* It has been composed by *Siu-Kouang-ki*, who, after having obtained the degree of Doctor, occupied successively the most eminent offices, and became preceptor to the eldest son of the Emperor. We see in his biography,* that in the 35th year of the reign of *Chin-tsong* (1607), he received lessons from a learned European named *Li-ma-teou*, (the celebrated missionary, Matthew Ricci), and that he studied under his direction astronomy, mathematics, in their application to the Chinese calendar, and the theory of fire-arms. The Emperor *Ssé-tsong* having heard that *Siu-kouang*, who had just died, had left a great work on agriculture, entitled *Nong-tching-tsiouen-chou*, ordered it to be presented to him by the nephew of the author, and ordered it to be printed at the expense of the state.

The third work is entitled *King-ting-cheou-chi-thong-khao*, or a General Examination of Agriculture, composed by order of the Emperor. It is twice as extensive as the preceding collection, and is composed of LXXVIII books, distributed in 24 volumes, small, in folio, printed with all the care and elegance that distinguishes the imperial editions. This compilation, undertaken a hundred years after, (in 1739,) in virtue of a special decree, by learned men of the first order, aided by the most skilful agriculturists of the empire, gives him a high importance. The extent of this work, its official character, and recent date, if compared with the two collections above-mentioned, have made me resolve to extract from it the Treatise on the *Cultivation of Mulberry Trees and the Raising of Silk-Worms*, the translation of which the Minister of Commerce has intrusted to me.

If I was not afraid of being misled from my subject, I would make all the objects known which this agricultural encyclopædia embraces. I will content myself to say that a complete treatise can be found there, (books XXI--XL.) of leguminous plants, of grain, and particularly of the cultivation of rice, accompanied by a number of figures engraved with care, of which more than a hundred represent the ploughing instruments of the Chinese, and the machines which they make use of for the irrigation of the fields. The part which I have translated occupies books LXXII, LXXVI.

The reader will be able to form an idea of the immense riches of the Chinese literature, by learning that the agricultural collections, entitled *Cheou-chi-thong-kao*, from which my translation is extracted, made a part of the library of the most estimable works in China, of which the publication was ordered in 1773, by the Emperor *Khien-long*, and which, according to the decree of this prince, was composed of a hundred and sixty thousand volumes. This collection was to form four libraries, called, *Ssé-kou*, or the *four Treasures.* It yet continues to be printed, and in 1818 there had already appeared seventy-eight thousand six hundred and twenty-seven volumes, of that vast collection. There has been published by order of the Emperor two accurate catalogues; one very much abridged, in fifteen small volumes, 12mo., (Peking, 1775,) and the other very extensive in one hundred and thirty-eight volumes, 8vo., (Peking, 1782.)

* *Ming-ssé* (Annals of the Dynasty of the *Ming*), book CCLI, folio 15, imperial edition, of twenty-four historians of the first order, in 700 volumes, small folio. Peking, 1739.

THE RAISING OF SILK-WORMS.

PRELIMINARY OBSERVATIONS.

Testimony from Chinese authors, who speak of the cultivation of the mulberry, and the raising of silk-worms, from the most ancient times, (4438 years ago,) down to the year 976 of the Christian era.

In the Book on Silk Worms we read:

"The lawful wife of the emperor *Hoang-ti*, named *Si-ling-chi*, began the culture of silk."

It was at that time that the emperor, *Hoang-ti*, invented the art of making garments.

Observations by the Translator.—The same fact is mentioned more in detail, in the General History of China, by P. Mailla, in the year 2602, before our era, (4438 years ago.)

"This great prince, *(Hoang-ti,)* was desirous that *Si-ling-chi*, his legitimate wife, should contribute to the happiness of his people. He charged her to examine the silk-worms, and to test the practicability of using the thread. *Si-ling-chi* had a large quantity of these insects collected, which she fed herself, in a place prepared solely for that purpose, and discovered not only the means of raising them, but also the manner of

reeling the silk, and of employing it to make garments."

It is through gratitude for so great a benefit, says the history, entitled *Wai-ki*, that posterity has deified *Si-ling-chi*,, and rendered her particular honors, under the name of the *Goddess of Silk Worms. (Memoirs upon the Chinese.* Vol. 13, page 240.)

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It is written in the chapter *Iu-hong*, of *Chou-king*, one of the five canonical books of China:

"The mulberry trees may be planted and the silk worms raised."

Observation.—According to the annals of China, this chapter was composed about the year 2205 before Christ, (4041 years ago.) See the *Chou-king*, translated by P. Gaubil, page 45. [St. Julien.]

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It is written in the *Book on Worms*, one of the five canonical books, chapter *Pin-fong*, ode 1:

"In the month, when the silk worms are fed, (in the fourth month,) the leaves of the mulberry trees must be gathered."

Observation.—This chapter was composed by *Tcheou-kong*, uncle to the emperor *Tching-wang*, about the year 1115 before our era (viz.: 2951 years ago.) [St. Julien.]

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We read in the *Li-ki*, or Book of Ceremonies, one of the five canonical Chinese books,) in the chapter *Youeï-sing*:

"In the last spring month, the young empress purifies herself, and offers a sacrifice to the Goddess of Silk Worms. She goes to the fields, situated to the east, and gathers mulberry leaves herself. She forbids the noble ladies and ministers' wives all ornamental dress, and she dispenses with the labors of her waiting-women, who sew and embroider, so that they may be able to give all their attention to the raising of silk worms."

Observation.—The *Li-ki*, (or Book of Rites,) from which this passage has been extracted, was compiled by Confucius, whose birth was 551 years before Christ.

The work we translate has many similar passages, which relate to the fourth and eleventh centuries before Christ. [St. Julien.]

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In the work entitled *Nong-sang-thong-kioué*, we read:

"The place called *kien-kouan*, (or the house of cocoons,) is that where the empress herself raises silk worms. In ancient times, there was a plantation of mulberry trees, belonging to the state, and a building called *Tsan-chi*, (or the house of the silk worms,) which had the same destination as that which is now designated by the expression, *kien-kouan*, namely, the house of cocoons.

"The young empress purifies herself, and offers a sacrifice to the Goddess of the Silk Worms, as an example to the whole empire, and to promote the general culture of silk. The empress repairs to a mulberry plantation. She first cuts a branch; an attendant, who holds a basket, receives the leaves of the mulberry trees; afterwards, the empress cuts three branches. A maid of honor, endowed with the title of *Chang-chou*, (or President,) throws herself on her knees, and says: It is enough. The attendant who holds the basket receives the leaves, and carries them to the silk worms. It is forbidden to carry the leaves of the mulberry tree to that part of the palace called *Ken-chi*, or the golden house."

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In the history of the emperor *Hiao-wen-ti*, whose reign began in the year 163, before Christ, it is observed:

"By a decree, the empress was commanded to gather the leaves of the mulberry trees herself, to feed the silk worms, and to furnish the garments destined for sacrifices."

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The year 156, *before Christ.*—The emperor *King-ti*, made a decree, and commanded the empress to gather some mulberry leaves herself, in order to set the example to the whole empire.

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The year 48, *before Christ.*—The mother of the emperor, *Youen-ti*, visited the house of cocoons, (or of the silk worms,) and followed by the empress and the ladies of the palace, she went and gathered some mulberry leaves.

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The year 58, *anno Domini.*—Under the reign of *Ming-ti*, of the dynasty of *Han*, the empress and her attendants raised silk worms.

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The year 220, *anno Domini.*—Under the dynasty of *Weï*, the wife of the emperor *Wenti*, raised silk worms, in a place situated to the north of the city, so as to conform to the ritual of the dynasty of *Tcheou*. [Work composed in the tenth century before Christ.]

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Between the years 265 *and* 275 *anno Domini.*—Under the reign of *Wou-ti*, of the dynasty of *Tsin*, in the years of *Thaï-khang*, the emperor built a house called *Tsan-kong*, for the silk worms. The empress went herself, to gather mulberry leaves, in order to conform to the ancient customs of the dynasty of *Han*, and those of *Weï*.

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Between the years 454 *and* 457, *anno Domini.*—Under the dynasty of *Song*, the emperor *Hiao-wou-ti* had a house constructed for the silk worms.

The empress gathered, herself, the leaves of the mulberry trees, conformably to the usage of the dynasty of *Tsin*.

The author of the work entitled *Nong-sang-thong-kioué*, continues to quote some analogous facts, which he had gathered from the history of the emperors, from the years of *Thien-pao*, (from 968 to 976,) of the dynasty of *Song*, under which he lived, so as to show, that from the highest antiquity, the empress raised silk worms as an example to the whole empire.

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In the work entitled *Tsan-lun*, or Considerations upon the Silk Worm, we notice:

"Every species of tree requires a particular soil, except the mulberry tree alone, which grows every where; and, consequently, there is not a single place in the empire where silk worms cannot be raised."

The book on worms says, in chapter *Pin-fong*, (composed about the year 1115, before Christ:)

"A young girl takes her elegant basket and follows the concealed paths, to gather mulberry leaves."

By this passage it is seen that silk worms could be raised in the country of *Pin*.

Observation.—The country of *Pin* corresponds with the territory of which *Si-gan-fou* is now the capital, of the present province of *Chen-si*, which is situated in the northwest of China.—[St. Julien.]

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In the ode of *Tsang-tchong-tseu*, of the same work, we read: "Take care not to destroy our mulberry trees."

This passage shows that silk worms could be raised in the country of *Tching*.

Observation.—The country of *Tching* corresponds with the country of *Tching-tcheou*, a dependency of the department of *Khaï-fong-fou*, in the province of *Ho-nan*, which is situated in the centre of China. [St. Julien.]

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In the ode entitled *Tche-sin*, we read:

"The mulberry trees grow upon steep hills, and poplar trees in moist valleys."

This passage shows that silk worms could be raised in the kingdom of *Thsin*.

Observation.—The country of *Thsin* corresponds to *Thaï-youan-fou*, which is now the capital of *Chan-si*. That province is situated in the north of China. [St. Julien.]

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In the ode entitled *Mong*, we observe:

"The mulberry leaves have not yet fallen; they are fresh and abundant." (*Ibid.*) "The mulberry leaves become yellow and fall."

Also, in the ode entitled *Sang-tchong*:

"He made an appointment to meet me among the mulberry trees."

These two passages show that silk worms could be raised in the kingdom of *Weï*.

Observation.—The country of *Weï* corresponds with the territory of *Weï-hoeï-fou*, in the province of *Ho-nan*, which is situated, as its name indicates, south of the yellow river. The *Ho-nan* is situated in the centre of China. [St. Julien.]

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In the ode entitled *Hoang-i*, we find:

"He cuts, he lops the trees, called *yen* (wild mulberry trees,) and *tché*, (thorny trees,) the leaves of which serve to feed silk worms."

This passage shows that silk worms could be raised in the country of *Tcheou*.

Observation.—The author continues to show, by quotations from ancient works, that silk worms could be raised in the country of *Tcheou*, which corresponds with a part of the actual province of *Hou-nan*, which is situated in the centre of China; in the countries of *Lou* and *Thsi*, (in the province of *Chan-tong*,) in the north of China; in the country of *Thsou*, (ancient name of the central province of *Hou-kou-ang*, of which has been formed, under the present dynasty, the provinces of *Hou-pé* and *Hou-nan;*) in the kingdom of *Liang*, which makes a part of the actual territory of *Ho-nan*, a central province of China, and in the country of *Cho*, which corresponds with a part of the present territory of *Ssé-tchouen*, a western province of China.

The author thus terminates this article: "The five kinds of seed may be cultivated, and harvests obtained, in the coldest countries of China; further, mulberry trees may be successfully cultivated under any temperature whatever."

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CONSTRUCTION OF THE SILK WORMS' APARTMENT.

In the Book of Rites, (written by Confucius, in the fifth century before Christ,) it is observed:

"The emperor and his vassals were obligated to keep a plantation of mulberry trees, belonging to the state, and a nursery for silk worms. It was established near a river or brook of running water; its height was about eleven cubits, and surrounded by a hedge of thorny shrubs."

Same Work.—Lots were drawn by the ladies of the three palaces, and the noble-women who were pure, and surrounded with happy omens, thus chosen; were sent to the nursery, to feed the silk worms, and occupy themselves with all the care of their raising.

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Thsi-min-yao-chou.—The windows in the four fronts of the building must be opened, and paper pasted on them, to protect the worms from the exterior air. In the interior of the silk room, fires must be lighted at the four angles.

Same work.—In the third month, at the period called *Thsing-ming*, (the 5th of April,) the women charged with the feeding of the silk worms, are ordered to prepare their dwelling, and to stop up the holes and cracks through which the air might penetrate.

Same work.—The silk worms naturally love repose, and fear loud cries; therefore, their house should be quiet, and exempt from all noise. They love the heat, and fear the damp; their apartments should, therefore, be constructed of boards. In a quiet and retired house they will not be troubled with the cries and clamor of men. In a close house they will be sheltered from the sudden south winds. In a house constructed with plank, they will be sheltered from the exhalations and damp vapors of the earth.

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The Book on Silk Worms.—The silk worms like an apartment with a mild temperature; on the contrary, the cocoons should be kept in cool places.

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Wou-pen-sin-chou.—The house of the silk worms ought to be distant from all impurities, and every thing that exhales a disagreeable odor, such as stables, cow-houses, &c. Care must be taken during the night, that no light may penetrate the windows, or suddenly be shown, in the dwelling of the silk worms. Do not extinguish, in the silk room, paper matches, such as emit a great deal of smoke.

When the worms are newly hatched, they fear the dust made in sweeping. They are disturbed by crying and weeping; they do not like persons to come in their apartments, who are not perfectly clean. For example: A woman who has been brought to bed less than thirty days, or who has her menses.

(That observation is drawn from another work upon the same subject.)

Same work.—Whenever the silk worms are raised in autumn, the time of their hatching is not distant from the three periods called *San-fo*. (They fall in the middle of summer.) The heat (of the summer) yet subsists, and as it occasions a great

deal of dampness in the apartments of silk worms, the necessary measures must be taken for the air to circulate freely in every part of the nursery.

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CONSTRUCTION OF THE OVEN.

In the middle of the house, a hole must be dug, of which the size and depth must be proportioned to the dimensions of the nursery. The ordinary size of this hole ought to be four feet square. On the four sides, a square brick wall, cemented with mortar, must be raised two feet in height. Cow dung must be taken well dried and reduced to powder, and the bottom of the hole must be covered with a bed of this powder, three or four inches thick. Above, a layer of small pieces of dry wood must be spread, at least five inches in diameter, which has been cut in the last month of the year. Mulberry, acacia, elm, or any kind of hard and solid wood may be used. Upon these pieces of wood spread a second bed of dry and pulverized cow dung. In the empty places, between each piece of wood, the pulverized cow dung must be well beaten down so as not to leave the smallest space; for if an empty space be left, the fire will produce flame, which may injure the house, and besides, this fire would not last for any length of time. When the hole is completely filled, and the pulverized cow dung, that covers the pieces of wood and fills the spaces between, is well pressed down, a bed of the same matter must be spread on. Seven or eight days before the hatching of the silk worms, live coals must be put on the dry cow dung and covered over with hot ashes.

The dry cow dung takes fire, and emits for six or seven days a black and yellow smoke. One day before the hatching of the silk worms, the door must be opened to dissipate the smoke, then carefully shut. From that moment the wood and the dry cow dung are completely on fire, to the bottom of the hole.

When the silk worms are young, they like the heat and fear the smoke, consequently a bright fire must not be made; moreover, a smart fire sometimes burns with force, and sometimes suddenly goes out; it cannot constantly spread an equal and uniform heat. But when the fire we recommend is once well lighted, it does not produce any smoke, and it can be preserved for one or two months without being extinguished or diminished. A mild heat is experienced without its being perceived that there is fire in the apartment. But if small branches be burnt, they will produce a smoke that will be spread throughout. It is necessary to construct, on the edges of the hole, a small square wall of bricks, about two feet high, so that the heat may ascend and penetrate to the middle of the apartment, and spread there in an equal manner. This wall will serve to prevent those persons who move round the silk room at night, from falling unawares into the hole. The house being constructed of dry and proper materials to receive the heat, the partition walls will soon become warm. The smoke proceeding from the pulverized cow dung, suffocates all the insects which might injure the silk worms.

Cow dung diffuses a wholesome smell in the apartment of the silk worms.

Observation of the Translator.—The surface of the hole ought to be covered with square tiles, pierced with holes, to facilitate the escape of the heat.

The old paper employed to cover the windows, must be replaced by white and perfectly clean paper. For fear the heat will escape, care must be taken not to raise the window shutters, or the straw mats from the windows, or the doors, during the time the old paper is being pulled off, and new pasted on. At the top of each window, place four large window blinds, or screans, of firm texture. They must be arranged in such a manner as to roll up or unroll when wanted.—(*Sse-nong pi-yong.*

Nong-sang-thong-kioue.—When a nursery is wanted, for the silk worms, a house must be constructed, exposed to the south. Above all, a smooth and agreeably situated place must be chosen. The best exposure is that exactly to the south; that of the south-west is not so good, that of the east still less so.

If the house is old, it must be swept with a great deal of care, and plastered a long time before it will be wanted. If it is done a short time before the hatching of the silk worms, the partition walls will preserve a dampness which will be fatal to them. Some persons cover the house with tiles, others with thatch. Timber and wood work must be plastered within and without to prevent the danger of fire. In the nursery, pillars must be placed, furnished with cross pieces, to receive the frames. The windows must have a large opening, to admit sufficient light to distinguish the sleeping and the awaking of the silk worms. Above the shelf, small dormer windows should be opened, to increase the light of the morning and evening, when required.

Even with the ground, pipes, or air conductors, communicating with the outside, must be placed at regular distances, and arranged so that they can be opened and shut easily. They will serve to dissipate dampness, or to expel dangerous effluvia.

Same work.—When persons wish to raise silk worms, they must at first open a room, situated to the east, to feed the newly hatched silk worms. They must be taken from this room before and after their second moulting. The window turned to the west, must be shut with care, because the rays of the setting sun are particularly injurious to the silk worms. The southwest wind is very dangerous for the silk worms. A row of trees, four to five feet distant, must be planted on the outside so as to shelter them.

[The author here employs many words to indicate the place of the idols, and practices of devotion, which must be followed for the success of the nursery.]

Same work.—When persons wish to feed the newly hatched silk worms, they must as first open a room with an eastern aspect. At the four angles, concave niches must be constructed, (small stoves) arranged like the three stars of the constellation of the heart, that is to say, in triangularly, in order to distribute the heat, in a uniform manner. The author adds, that the smallness of the room allows it to be easily warmed.

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Nong-sang-thsiouen-chou.—When the silk worms are about hatching, they require an extreme heat; at that time the air is still cold. After the third sleep (or the third moulting,) the silk worms require coolness. At that period the air is warm. Besides the wind, rain, dull, and clear

weather often comes on unexpectedly; the temperature of the morning and evening, that of the day and night, undergoes great changes. If under these circumstances, the proper measures are not taken, the silk worms soon become sick. But all these changes of the atmosphere may be guarded against, if the rules we have described above be faithfully followed.

All around the nursery, (that is to say, at each window,) window blinds must be placed, which can be rolled up and unrolled at will. In the middle of the room, a fire must be lighted under ground. If the silk worms require heat, and the external air be cold, the mats that cover the windows must be let down, and the heat disseminated throughout the nursery. Then the cold from without cannot penetrate there, and a mild temperature is enjoyed throughout. But if it be rigorously cold, it will be impossible to warm the apartment, even by opening the doors of the oven; clods of dry dung must be lighted on the outside, and when they are set on fire, and produce no smoke, they must be placed at the four angles of the silk room. Soon a mild heat will be spread throughout; and as soon as the cold is diminished the rest of the burning lumps must be carried away.

When the silk worms require cooling, and the exterior air is warm, the openings of the heated pipe must be shut, and the window blinds raised up; then the interior heat moderates, and the fresh air from without penetrates the nursery. If it be sultry, it will not be sufficient to raise up all the window blinds to dissipate the heat. The paper must then be removed from the windows, the small dormer windows of the roof must be opened, and the air conductors also, which are even with the ground, and fresh water must be sprinkled outside of the windows, and about the bottom of the sash. A cool air will soon circulate in every part of the nursery.

When that sultry heat is dissipated, the paper must be again pasted on the windows, and the air pipes stopped up. In this manner the silk worms are neither incommoded with the heat nor cold, from the commencement to the end of the season. They have very little sickness among them, and the cocoons are as good as may be desired. It is by observing these proceedings that all the success of the raising of silk worms depends. But the cool air must not be suddenly replaced by warm; the fire must be increased gradually. If the cold rapidly succeeds to heat, the silk worms will become yellow and soft. When it is too warm, a cool air must not be introduced suddenly in the nursery; the windows should be opened by degrees. That precaution is necessary, for if the heat be suddenly replaced by a cool air, the silk worms will turn white and die. It is a serious danger, which should be known before hand, in order to remove the causes which give rise to it.

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ON BATHING THE EGGS OF SILK WORMS.

The old Dictionary *Eul-ya*, says there are three kinds of insects which form cocoons: 1st, the *Siang*, or the silk worm fed on mulberry leaves; 2d, the *Tcheou-in*, those fed on leaves of the jujube, and trees called *hoa* and *louan*; 3d, the *Hang*, which is fed on leaves of the plant called *siao*.

In the *chou-king*, (one of the canonical Books of the Chinese,) it is written: "The first day of the moon, of the last Spring month, the Prince's wife washes the eggs of the silk worms in the river."

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Abridged history of the kingdom of Ou.—In the district of *Nan-yang*, the silk worms form cocoons eight times a year.

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Kouang-tchi.—There are several varieties of silk worms, the autumn, winter, and wild silk worms.

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Yong-kia-ki.—In the district of *Yong-kia*, there exist eight species of the silk worm:

1st. The silk worms called *Hang-tckin-tsan*, form their cocoons in the third month, (April.)

2d. The silk worms called *Tché-tsan*, that is to say, worms which are fed with the leaves of the tree *tché*, form their cocoons at the commencement of the fourth month, (May.)

3d. The silk worms called *Hang-tsan*, form their cocoons in the fourth month, (May.)

4th. The silk worms called *Ai-tchin-tsan*, that is to say, cherished and precious silk worms, form their cocoons in the fifth month, (June.)

5th. The silk worms called *Ai tsan*, or cherished silk worms, form their cocoons towards the end of the sixth month, (July.)

6th. The silk worms called *Han-tchin-tsan*, that is to say, cold and precious silk worms, form their cocoons in the seventh month, (August.)

7th. The silk worms called *Ssé-tchou-tsan*, that is to say, silk worms from a fourth laying of eggs, form their cocoons at the beginning of the ninth month, (October.)

8th. The silk worms called *Han-tsan*, that is to say, cold silk worms, form their cocoons in the tenth month, (November.)

In the same work we read:

All the silk worms of the first kind, which mature twice a year (that is to say, those that lay eggs for a second progeny the same year,) are called *Tchin-tsan*, that is to say, precious silk worms. There are few persons that raise silk worms called precious.

The worms of the fifth class, called *Aï-tsan*, or cherished silk worms, proceed from the eggs of the worms of the third class, anciently called *Hang-tsan*.

When the silk worms (of the first class) called *Hang-tchin*, have formed their cocoons, in the third month, (April,) the moths appear, and their eggs must be collected. In the seventh and eigth month, the eggs open, and the moths are hatched. A great number of persons raise this species of silk worm. They are called *Hang-tsan*, or silk worms of the third class.

When silk worms called *Aï-tsan*, or cherished silk-worms, (of the fifth class,) are wanted, eggs of the worms of the third class, called *Hang-tchin*, must be taken, and put in an earthern vessel, the dimensions of which should be in proportion to the quantity of eggs that are required to be preserved. The opening of the vessel must be stopped up with paper, then the vessel must be placed in a basin, filled with spring water, in order that the cool air may delay the hatching of the eggs.

Thus the eggs must be left from three to seven days; at the expiration of that time they hatch, and the silk worms can be raised. They are called *Aï-tchin*, or cherished and precious silk worms; they are also named *Aï-tseu*, or beloved children. They are of the fourth class.

When they have formed their cocoons, the moths come forth and lay their eggs. Seven days after the laying of eggs, they hatch and become silk worms. A great number of persons raise worms of that kind. They are the worms of the fifth class, called *Aï-tsan*, or cherished silk worms.

Care must be taken that the water surrounding the vase be of the height of the eggs it contains; for, if the exterior water be raised above the line of the eggs, they will die, or not be hatched. If the exterior water be lower than the eggs, then they will not feel the cool air, and their hatching will not be delayed. If their hatching be not prevented, they cannot be preserved from three to seven days in the vase. If they cannot be kept from three to seven days in the vessel, when they hatch, they will fail to *accomplish their task*, that is to say: they will attempt, in vain, to spin their cocoon. When the moths have come forth, and the females have laid their eggs, they cannot hatch at the end of seven days; these eggs will not hatch until the following year; but they must be deposited under the shade of a bushy tree. Some persons put them in unbaked earthern vessels. They hatch in from three to seven days, and the worms which proceed from them succeed in forming a good cocoon.

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Tsa-hou-hing-chou.—Thirteen varieties of silk worms are now distinguished:

1st. The silk worms which have three moultings, and only hatch once;

2d. The silk worms which have four moultings, and hatch twice; that is to say: those whose eggs produce a second crop in the same year;

3d. The silk worms with white heads;

4th. The silk worms called *Hié-chi-tsan;*

5th. The silk worms of the country of *Thsou.* (*Thsou* is the ancient name of the present province of *Hou-kouang.*)

6th. The black silk worms; among them, some hatch once, others twice. (See 2d;)

7th. Ash colored silk worms;

8th. The silk worms hatched from an Autumn moth;

9th. The silk worms hatched in the middle of Autumn;

10th. The silk worms called *Lao-Thsieou-eul-tsan*, (literally, old towards Autumn;)

11th. Silk worms of the last of Autumn, called *Lao-hiaï-eul-tsan;*

12th. Silk worms called *Kin-eul-tsan;*

13th. Silk worms that work in the same cocoon. Sometimes two, sometimes three silk worms, spin together in the same cocoon.

In general, the silk spun by the worms, which moult thrice, differs much from that of the worms which moult four times.

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Hai-ning-hien-tchi.—On the night preceding the period called *tsing-ming*, (the 5th of April,) those who raise silk worms envelop the eggs in a covering of cotton, and place it under them, in their bed; they think the natural heat of the human body hastens the hatching of the silk worms.

Same work.—The twelfth day of the last moon of the year (that is to say, at the end of December, or in the month of January, when there is an intercalary moon,) all those who raise silk worms bathe the eggs in salt water, expose them to the fumigations of the melongena, and envelop them in a piece of rice ball. At the end of twenty-four days they take them out; they afterwards wash them in fresh water, and wait for the coming of Spring.

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Sse-nong-pi-yong.—The summer silk worms are of another species; they are vulgarly called *San-tsan*, or third silk worms.

The silk worms which are raised in the Spring, lay eggs for the Summer; those that are raised in Summer, lay eggs for the Autumn; those of the Autumn, lay eggs for the Spring of the following year. None of these eggs must be neglected, for otherwise eggs will be wanted for the next raising.

Same work.—The silk worms of Autumn, are also called *Youen-tsan*, that is to say: second silk worms, or silk worms of a second rearing. But in gathering the leaves to feed them, they never fail to injure the tree. It sometimes happens, that some misfortune from heaven destroys the Spring silk worms, the raising of the Autumn silk worms cannot be dispensed with, but must be done to repair the loss. But the late crops are surer and more advantageous than those of the commencement of the year.

Siu-kouang-ki, says: "The men of the present day do not raise the Autumnal silk worms; they are contented to preserve the eggs of the Summer for the crop of the following Spring. They succeed equally well."

The same author again says: "It is a very just idea to say, the Autumn silk worms serve to repair the losses which may have been experienced in the Spring, and to supply the wants of the year. In the Autumn there are many fine days; consequently, the raising at that time promises more certain success, than that of the Spring. But now-a-days we meet with people who say: *the Autumnal silk worms can no longer find tender leaves.* We see that they are totally ignorant of the powerful reasons which may oblige them to attempt a rearing in Autumn, from the necessity of sometimes repairing the losses which have been experienced, and of supplying the wants of the year. When the silk worms are raised in the Summer, or Autumn, care must be taken to preserve them from the gnats and flies."

Same work.—After the period called *Thsing-ming*, (after the 5th of April,) the eggs commence to change. At first they assume a uniform color, and swell up; afterwards they grow round and present a pointed side. Their centre resembles the color of willow trees, in the beginning of Spring. At last they are transformed into worms, which have the appearance of small black ants. The worms which fold themselves in a circular manner, and resemble a mountain that is seen at a distance, are those which must absolutely be preserved; but those with flat heads, which are dry, and appear as if they were burnt, as well as those of a sky-blue, and yellow, or flesh color, must not be raised.

Same work.—Some persons water the eggs with salt water. That operation is called *sien-tsan*, that

is to say, *baths of the silk worms*. The eggs thus washed, produce the best silk worms.

The worms of which the eggs were not washed, are called *Ho-tsan*, that is to say, ardent silk worms, (they are those of Autumn.) They are less esteemed than the preceding.

In the work entitled *Sang-tsan-tchi-choué*, we read:

"Those who wish the eggs to hatch quickly, often unfold, and roll up one by one, the leaves of the paper where the moths have deposited their eggs. (This paper should be manufactured of cotton, or the bark of mulberry trees. According to the ideas of the Chinese, they banish from the nurseries every thing made of hemp; for example: ropes and hempen cloth. Our European paper would be very injurious to silk worms.) Those who wish to retard the hatching, unfold the leaves at distant intervals, and afterwards roll them in a tight manner, without leaving the least empty space in the centre of the roll."

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Hoang-sing-tseng, says:—The twelfth day of the last moon, in December, or in January, if there is one intercalary month, the eggs must be soaked in salt water, and taken out the twenty-fourth day. Then the silk will be much easier to wind.

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Another author, says:—The eighth day of the last moon, the leaves covered with eggs must be dipped in water where the ashes of the mulberry branches have been boiled, or the ashes of grass. They must be taken out at the expiration of one day. The twelfth day of the second moon, a bath must be given to the eggs, on the morning of the period called *Thsing-ming;* then they must be wrapped up in cotton paper, and deposited in the kitchen. Wait until the mulberry leaves are as large as a tea-spoon, then envelop the eggs in cotton: at night they must be covered with warm garments which have been worn during the day; in the morning they must be wrapped in blankets. When the eggs are hatched, the worms must be warmed by artificial heat; but so long as they are not out of the egg, they ought to be well taken care of, and hatched by the heat of fire.

When it is desirable to soak the leaves of paper, covered with eggs, the ashes of the mulberry tree must be used; the leaves should be moistened, and powdered with the ashes. Afterwards they must be rolled and soaked in the water where a certain quantity of salt has been dissolved. If it be apprehended that the rolls of paper will swim, they must be kept in submersion, by placing them under a china plate. The paper ought to be taken out the twenty-fourth day.

The leaves must be washed in running water, to remove the ashes, or they may be washed in a basin. Afterwards they can be newly hung up in the cool air, and the eggs hatched in the beginning of Spring. If part of the eggs do not hatch, they must be kept in darkness, and nothing more is to be feared from a useless expense of leaves.

The twelfth day of the second moon, leaves of plants called *thsaï* and *yé-thsaï*, blossoms of the leek, peach tree, and white beans, must be taken. They must be crushed in water, and afterwards the leaves must be bathed in it.

When the females lay eggs, they generally stop at the end of one night. In the contrary case, the silk worms produced by their eggs, cannot all hatch together.

Same work.—Many persons preserve the eggs of the silk worms, in bamboo boxes, when they are exposed to all the changes of the damp, tepid, hot, or burning weather. If they are subjected, suddenly, from cold to excessive heat, they are affected by it in a fatal manner. The inhabitants of the province of *Tché-kiang*, call that *Tching-pou*. That expression implies, that the silk worms contract a disease, when they are in the egg, (literally, *on the linen cloth*, or on the leaves of paper.) The worms of those eggs are yellow when hatched: the worms hatched of a yellow color, are not worth the trouble of raising. They may be compared to a child who has contracted a disease in the womb. At its birth, it is weak and feeble. It is difficult to cure it of this innate disease. In general, when one wishes to preserve the eggs of the silk worms, the leaves must be spread on bamboo boards, making it so as not to be exposed to the wind or sun. Moreover, they must be covered with a silk cloth to prevent butterflies, or insects from the cotton plant, eating them.

Much snow may be expected about the first day of the last moon, it may be in the course of the last moon. Leaves covered with eggs are spread in the midst of the snow. After one day they must be taken up, and newly spread on bamboo boards, and covered as before with a silk cloth.

When Spring comes, the precise time when the eggs are about hatching must be attentively observed; powdered cinnabar, must be taken, diluted in lukewarm water, and the eggs dipped in that water. The water should be neither too cold nor too warm; it ought to be kept at the temperature of the human body.

Same work.—Before the worms are hatched, the eggs should be weighed, and the weight written on the back of the paper to which they are attached. When the silk worms are hatched, take care not to separate them from the paper. There are many persons, who as soon as they see the worms hatch, detach them from the paper, with a small broom or quill; but these little beings, as delicate and slender as a hair, or a bit of silk, cannot support the wounds given them with the broom or quill. The mulberry leaves must be cut into extremely fine shreds, and spread in an equal manner, upon a large sheet of paper. The side of the paper, on which the worms are hatching, must be applied to that which is covered with bits of the mulberry leaves. The worms liking the smell of mulberry leaves, descend themselves on the paper, destined to receive them.

Then the paper, on which the eggs were, must be newly weighed; the quantity of hatched worms will be known, and it can be calculated how many leaves will be required to feed them. It is much better to have more leaves than are wanted for the number of silk worms to be raised. Then an abundant nourishment will be had for the silk worms, and one will not be exposed to the misfortune caused by a scarcity of leaves.

There are many persons who do not make this calculation beforehand; but when the leaves are about failing, they find themselves reduced to the most painful extremities; they pawn, or sell their effects to procure them. They have the grief of

seeing their silk worms tormented by hunger; the hurdles are strewed with worms that languish and die. Thus, by their want of forecast, they uselessly sacrifice the lives of a great number of these precious insects.

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Nong-sang-tsi-yao.—It depends on one's self to retard or hasten the changing of color, in the eggs; but care must be taken to change them in a natural manner, and not to compromit the life of a silk worm enclosed in the egg.

When the leaves of the mulberry tree are grown, at eight or ten o'clock in the morning, the sheets of paper must be taken out of the vase, unrolled and hung up. There is no rigorous rule to determine the progress of the eggs. Only the first day, their color must be changed to three-tenths, the second day to seven-tenths. Then the leaves must be rolled, they must be put in a paper tube, with the two ends well pasted, and they must be replaced in the vase. The third day, towards twelve o'clock, the rolls must be again taken out of the vase and unfolded. Their color will then be completely changed.

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Nong-sang-pi-Kioue.—The art of raising silk worms begins with the choice of the eggs, and the preservation of the cocoons. Select in the cocoon room, the cocoons that are turned towards the light (that is to say, those from the top of the cocoon room) such as are brilliant, neat, and of a firm texture.

The moths which come out the first day, are called *miao-ngo* (viz: grass moths. The latest of all, are called *mo-ngo*, (that is to say: the last butterflies.) Neither of them ought to be kept. Only those which come out after the second day must be taken. The sheets of the paper must be spread upon the cases of a shelf, then the males and females come close together and copulate. When the evening comes, the male butterflies must be taken away, and the females must be placed on sheets of paper, leaving an equal distance between them. The eggs which are found in lumps, ought to be thrown out. When the females have laid a number of eggs, they must be left on the sheets where they are deposited and covered from three to five days. When the sheets are hung up, the eggs ought to be turned outward (read: in-ward) for fear the wind may cause them to perish.

Same work.—At the winter solstice, and the eighth day of the last moon, the eggs must not be bathed in too deep a water.

After having dipped them, they must be taken out. The fifteenth day of the moon (when it is full) several sheets must be taken, covered with eggs and rolled together. Tie them firmly with a string of mulberry bark, (or of cotton,) and suspend them before the porch or vestibule of the house, at the height of a long pole, in order that they may be exposed to the cold which is felt at the close of the year. After new-year's day the rolls must be spread out, and placed upright in an earthern vessel. At the end of ten days, when the sun is above the horizon, the leaves must be taken out of the vessel. Whenever the weather has been dull or rainy, they must be exposed to the heat of the sun, as soon as they commence to hatch.

Such is the manner of bathing and preserving the eggs of the silk-worms.

Wou-pen-sin-chou.—At the time called *thsing-ming*, (the 5th of April,) take the leaves covered with eggs, which have been deposited in an earthen vessel and transport them, sheltered, from the wind to a room where a mild heat reigns, and suspend them at half the height of the apartment.

At the time called *kou-iu*, (28th April,) expose the leaves to the air and sun, but they must be inverted or turned inside out. You must roll from left to right those that were rolled contrarily, and you must roll from right to left those that were rolled the opposite way; every day you must change and roll them in a different way from the old one. After having sufficiently rolled and unrolled them, you must put them as before in the vase.

When the time of hatching approaches, the leaves must be carried to a room where they will be sheltered from the wind and sun; the silk-worms will hatch *all at once.*

Same work.—To make the silk-worms descend, when hatched, there are many persons who strike the reverse of the leaves with a small stick of peach wood. When the worms have descended, they gather them together with a small broom or quill, put them in an envelop of paper and weigh them, then spread them upon the hurdles. Afterwards, at the different periods of their existence, they experience diseases which are frequently produced by that dangerous practice.

When the worms are hatched, a bed of chopped straw must be placed on a hurdle, where are likewise placed one or two jujube fruits, cooked in the ashes. Before the hatching of the silk-worms, the leaves covered with eggs must be weighed. After the hatching, the newly hatched worms must be spread on the chopped straw, distribute them in an equal manner, and very distant from one another.

When the worms are all hatched, the empty leaves must be weighed, and the exact quantity of worms to be raised will be known.

If the rules we have just laid down are faithfully followed, not one silk-worm out of a hundred will be lost.

We see persons at the present day, who deposit on a single mat, worms proceeding from one or two ounces of eggs; they are heaped up, and pressed against one another. The infallible result is, that they lose a great number of silk worms.

When a person has newly hatched silk worms, the proceeds of three ounces of eggs, it is necessary to spread them in an equal manner upon a large hurdle. Above all, do not raise too great a number of silk worms, for, if your means only permit you to nourish the silk worms proceeding from three ounces of eggs, and, from cupidity, you attempt to raise the worms of four ounces of eggs, you will soon feel the want of space, hurdles, laborers, and fuel. In this manner you will lose, at the same time, your silk worms, and the expenses incurred in that unprofitable attempt.

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Nong-tching-tsiouen-chou.—In the work entitled *Ssé-nong-pi-yong*, we read:

"To make silk worms hatch, the degrees of heat and cold, proper for them, must be known, and the manner of hastening or retarding their hatching, in order that *not one may hatch before or after the others.*

"The following method must be pursued:

"When the eggs have assumed an ash color, the leaves covered with eggs must be united two by two, and extended upon a clean frame. Afterwards they must be rolled up tightly and the two ends tied with a pack-thread, (of cotton or bark of the mulberry tree,) and the rolls placed upright in a clean, cool room, where there is no smoke.

"The evening of the third day, the rolls must be taken, unfolded, and extended on the hurdles. It is a very happy circumstance if none of the worms are hatched. But if by chance there are any hatched before the others, they must be taken and thrown out. Afterwards the leaves must be taken three together, rolled in a loose manner, and deposited in the room newly warmed for the silk worms. The time of the rising of the sun must be attentively observed, then the leaves must be unrolled, and spread, one by one, upon hurdles in the middle of the yard. If there is any dew the hurdles must be placed in a cool room, or under a kind of tent. Some time after, the leaves must be transported to a room prepared for the silk worms, and they must be spread, one by one, upon hurdles placed on the ground. After a few moments the silk worms will hatch *all at once*, looking like small black ants. There will not be one that will hatch before or after the others. The hatched worms must then be weighed with the leaves of paper, to know the number of silk worms to be fed, and to calculate, in advance, the quantity of leaves which will be wanted."

Same work.—When the newly hatched worms are made to descend, they must be dealt carefully with, spread upon the hurdle in an equal manner, and a proper space left between them. Care must be taken not to wound them, or to press one against the other. As soon as the worms are all hatched, the fresh and tender leaves must be taken. and cut in very fine shreds, with a very sharp knife; then they must be spread, with a coarse sieve, upon the sheets which are to receive the silk worms, and under which a bed of chopped straw must be previously spread. The cut leaves must be spread in a uniform manner, in very light layers. Afterwards the sheets of paper must be taken, where the worms newly hatched are, and they must be applied to the mulberry leaves; the worms descend themselves on the mulberry leaves. If some worms are too long a time in descending, or if they ascend upon the back of the sheet of paper, or if they do not descend, when the leaf is turned over, they must be thrown away, with the leaf to which they remain attached. They are diseased worms, that it would be impossible to raise.

Same work.—The success in raising silk worms depends on the precaution which is taken in the beginning, and subsequently, not to expose them to any danger. If the silk worms do not revive *all at once*, from their first sleep, or moulting, it proceeds from their not having changed color, and not hatching *all at once*. If they do not change color, and do not hatch *all at once*, it is because the rules prescribed to preserve the eggs, have not been strictly followed.

Same work.—In the work entitled *Thsin-kouan-tsan-chou*, we read:

"The first day of the last moon the eggs must be collected and watered with cow's urine; afterwards they must be washed with clean water. It must be so done that the sheets of paper covered with eggs be not torn. (An author advises to strengthen them with threads of cotton or silk, basted at distances according to their length and breadth.")

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FOOD FOR THE SILK WORMS.

Kouai-ki-tchi.—The greater part of the spring silk worms have four moultings, all the others have but three. The inhabitants of the country of *Youé* express the idea attached to the word *mein*, sleep (moulting) by the word *yao*, youth. Thus they say: the first, second and third youth of the silk worms.

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The Book on Silk Worms.—Three brilliant colors are distinguishable in the silk worm:

When they are of a shining white, feed them moderately;

When of a dazzling blue they must be abundantly fed;

When their skin is wrinkled, it is a sign that they are hungry;

When they are of bright yellow, diminish, by degrees, their food.

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Thsi-min-yao-chou.—Whenever the silk worms are fed, the window blinds must be raised up, and closed again when they have finished eating. The light excites an appetite in the silk worm, (literally: as soon as the silk worms see the light they eat.) After a plentiful meal they grow and become large.

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The Book on Silk Worms.—The next day, after the hatching of the silk worms, mulberry leaves, or leaves of *tché*, dried in a well-aired place, must be given to them. When they are about the twentieth of an inch long, they will eat five times during the day and night.

The ninth day they refuse food during one day and night. This repose is called the first moulting.

Seven days after, they again moult, as the first time. When they have eaten some leaves and attained the length of the tenth of an inch, they will feed six times during the day and night.

Seven days after they moult as before.

Five days after they leave off eating. This abstinence lasts for two days, (the sixth and seventh days;) it is called *ta-mien*, or the great moulting. Then the silk worms eat but half the leaf. They will feed eight times during the day and night.

Three days thereafter they have a great appetite; then they will eat the whole leaf. They will feed ten times during the day and night. Before three days have elapsed, they begin to work at their cocoons.

When the silk worms begin to feed, after each moulting, leaves must be spread lightly over them. If the leaves are thrown in upon them, sensations will be produced destructive to their appetite.

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Observation by the Translator.—The preceding extract relates to silk worms of four moultings, the raising of which lasts a longer time than that of the ordinary silk worms, that is to say: silk worms of three moultings.

Ho-pi-sse-loui.—When the silk worms lay down and remain motionless, that repose is called moulting. During the time of moulting they do not eat, either the mulberry leaves, or leaves of the tree, *tché*. At the end of one day and night, they shed their skins.

There are some silk worms which have three moultings, and others four.

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Hoang-sing-tseng, says:—From the hatching of the silk worms to their third moulting, cut leaves ought to be constantly given them. When the ardent silk worms are fed, that is to say, Autumn silk worms, they must be carefully watched. As soon as they have eaten their leaves, give them more, for they will fall sick, if they breathe the heat of the silk room fasting.

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Nong-sang-tsi-yao.—Towards the end of Autumn, before the mulberry leaves turn yellow, a large quantity must be gathered. They must be dried and broken up in such a manner so as to be reduced almost to powder. They must be preserved in a place warmed by a fire that produces no smoke. They will answer the next year to feed the spring silk worms, after each of their moultings.

Same work.—The eighth day of the last month, (January,) small green peas, called *lo-teou*, (dolichos,) must be soaked in fresh water. They must be spread on frames, not very thick, and dried in the sun. Wash some clean rice in pure water and dry it also. These green peas and rice must be preserved in a shaded place. Flour made from them, will serve to feed the silk worms after their last moulting. It must be spread equally on the leaves given to them for food.

Same Work.—Manner of feeding the newly-hatched silk worms.—The leaves of the mulberry must be frequently cut in very fine shreds, and lightly spread over them with a sieve. The food ought to be distributed without interruption. In the space of one hour, (two of our hours) four meals must be given them, which makes forty-eight repasts in the space of one day and night.

Same work.—Food must be given to the silk worms without fail during the day and night. If their repasts are multiplied, it will necessarily result, that they will soon arrive at maturity; but if their meals are rare, and not numerous, they will attain their growth slowly.

When the silk worms attain maturity in twenty-five days, one frame or hurdle will furnish twenty-five ounces of silk. If in twenty-eight days, only twenty ounces can be obtained. If the time be one month, or forty days, one hurdle will furnish but ten ounces of silk.

Those persons who feed silk worms ought to endeavor not to sleep. Laziness has serious inconveniences.

Every time the silk worms are fed, all the hurdles must be visited with the greatest attention. It is essential for the leaves to be distributed in an equal manner. If the weather be dark and rainy, if the exterior air be cold, before feeding the silk worms, dry branches of mulberry trees must be taken, or rather a handful of rice straw, stripped of all its leaves, fire must be put to it, and the flame put around and above the hurdles in order to dissipate the cold and damp which benumbs the silk worms. After that operation they must be fed. In that manner they do not contract any disease. The time of their general moulting must be observed, and then the feeding must be suspended. Afterwards nothing is given them to eat, until they are all recovered from their torpid state. If food is given them, when they are but eight or nine-tenths of them recovered, they will not arrive, *all together*, at maturity; besides, great numbers of them will be lost.

From the second to the great moulting, (the third moulting,) when the worms assume a glossy yellow color, and when they are disposed to moult, the nourishment must be suspended, and they be transported to other frames. Afterwards, when they are all recovered, they must be slowly fed, that is to say: they must have their repasts given them at long intervals, and leaves must be spread on them in very light layers. If the leaves were distributed too abundantly, they would eat without appetite and become sick. Now, as it is the food which gives strength and life to the silk worms, the greatest attention must be paid to see that it be suitable and possesses all the proper qualities. The silk worms like not leaves saturated with rain or dew; if they eat of them, the greatest number immediately fall sick.

Same work.—When the silk worms recover from their great moulting, (their third moulting,) the heat of the rooms must be diminished when it incommodes them. At that time frequent meals must be given them. If a south wind blow, the window blinds must be let down, and the straw mats of the doors closed. At that moment they must be transported to other hurdles. When the silk worms are spread on the hurdles, the distance of one finger must be left between each one. Then the small green peas, which were reserved from the month of January, must be taken, and soaked in a small quantity of water, until they germinate: afterwards they must be dried in the sun, and reduced to powder.

The clean rice, which was also laid by in the month of January, can be employed for the same use, after having been boiled by steam, and reduced to flour. At the fourth feeding, that flour must be spread in a uniform manner, upon mulberry leaves. It will refresh the silk worms, and dissipate the internal heat they feel at that period of their age, and which is a mortal poison to them. The silk they afterwards produce, is more abundant, easier to reel, and, besides, it is stronger and more brilliant.

If there be but a small quantity of fresh leaves, the leaves which were cropped the preceding autumn must be taken, pounded again and reduced to powder. The new leaves must be lightly moistened, and the powdered leaves spread on in a uniform manner. Thus a want of leaves may be supplied. The leaves of the plant called *ou-kiu, (cicorium intubus?)* can also be used as a substitute for that flour.

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Nong-sse-pi-yong.—Same subject.—Early in the morning, the roots of the mulberry trees must be watered, and the leaves gathered soon after. If they are watered early in the morning, the leaves will be very juicy; if they are gathered soon after having been watered, they will not wither.

They must be cut in fine shreds with a well sharpened knife, and spread in light layers, with a

coarse sieve. If a very sharp knife be not used, the leaves will lose their juice; if they be not cut very thin, they will cover and overload the silk worms. If a sieve be not made use of, they will not be distributed in an equal manner; if the cut leaves be not distributed in an equal manner, the silk worms will not all eat an equal quantity.

The juice of the leaves is not very abundant; at the expiration of some time, it dries up; for that reason the leaves immediately after the watering require to be sifted on the silk worms.

The first day, two repasts an hour must be given them, that is to say, about forty-eight repasts in the space of a day and night.

The second day, thirty repasts must be given them, in the same interval of time, and the leaves which are distributed to them, must be cut a little smaller.

The third day, only twenty meals must be given them (during the day and night,) composed of leaves thinner than the second day. They must be kept in great obscurity and heat. Generally, the newly hatched worms require darkness. When they recover from their sleep, or moulting, a little light ought to be allowed them; at a later period, when they show a smart appetite, a great deal of light must be given them.

Same work.—Another method.—As soon as the leaves are cut very fine, they must be spread in light layers with a sieve. Four repasts must be given by the hour, (two of our hours,) which makes about forty-eight repasts in the space of one day and one night. Some persons give but thirty-six in the same interval of time. This is my opinion. The newly hatched worms only feed on the juice of the leaves. If their repasts are not multiplied, they will resemble young foster children who are deprived of milk from their infancy; consequently, they never fail to be weak, pitiful and sickly.

Leaves full of juice, which have been gathered the preceding night, from the branches exposed to the south-east, must be given them. These leaves must be kept apart, in an earthen jar, and cut up very fine as soon as they have been taken out.

Same work.—Method for diminishing the food and hastening the moulting.—When the silk worms are disposed to sleep, (to moult,) their food must be diminished in proportion to the degree of yellow or white which their skin assumes; the leaves destined for their food must be cut in fine shreds, and frequently spread in light layers.

When the silk worms are completely yellow, they ought to be transported, in succession, to other hurdles, without caring whether the sky be dark or serene, if it be in the morning or the middle of the night. When they have been transported to other hurdles, the feeding must be suspended until they have all recovered from their moulting, when they may be fed again. This is called *diminishing the food* and *deciding the moulting*. These two expressions imply, that the nourishing of the silk worms, which are disposed to moult, must be diminished, (care must be taken not to cover or overload them with leaves,) and, on the other side, the silk worms must be abundantly fed, (which are not disposed to moult,) in order that they may quickly moult. Not only will they *all moult together*, but they will be exempt from diseases caused by the accumulation of leaves, and the internal heat which consequently follows.

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Nong-sang-thong-kioue.—The silk worms may be found in ten different situations: They may be cold or hot, starved or satiated, sufficiently far apart, or too near together, asleep or awake; they may eat slowly or with appetite.

Same work.—Injurious things to the silk worms.—1st. The silk worms do not like to eat damp leaves;

2d. They do not like to eat warm leaves;

3d. The newly hatched worms do not like the smell of fish, fried in a pan;

4th. They do not like to be in the neighborhood of persons who pound rice in mortars;

5th. They do not like to hear strokes on sonorous bodies;

6th. A woman, who has borne a child within a month, ought not to be *the matron of silk worms;* that is to say: ought not to be charged with the raising of silk worms;

7th. They dislike men, who smell of wine, to give them food, to transport them from one place to another, or to spread them on hurdles;

8th. From the time they are hatched, until maturity, the silk worms dread smoke and odorous exhalations;

9th. They do not like to have skin or hair burnt near them;

10th. They do not like the smell of fish, musk, or the odor of certain herbaceous animals, (like the goat, &c.;)

11th. They do not like to have a window, exposed to the wind, to be opened during the day;

12th. They do not like to receive the rays of the setting sun;

13th. They do not like, when the temperature of their habitation is warm, to have a sudden cold or violent wind introduced there;

14th. When their habitation is cool, they do not like a sudden change to excessive heat;

15th. They do not like dirty and slovenly persons to enter their room;

16th. Care must be taken to keep all noxious effluvia and filth distant from the apartments of the silk worms.

Same work.—The third day between ten and two o'clock in the afternoon, three hurdles, or frames, must be placed upon another stage. The one above protects the worms from the dust; that below protects them from dampness; and the middle one is destined to receive the silk worms. Young silk worms when incommoded by internal heat must be changed. A small quantity of worms, occupying a space as large as a square of a chequer-board, must be deposited on the middle frame; they will soon cover it entirely. By degrees the quantity of food must be increased. In the morning, if the weather be clear, the window situated to the east can be opened, and during the day, those which are in an opposite direction to the wind. By degrees they will change color; and, according to the color they assume, their food must be increased or diminished. When they are completely yellow, food must not be given them. They remain motionless, and that is called *theou-mien*, (or the first moulting.) When they have been removed after their first moulting, six meals may be given them, during the space of one day and night. The second day

the quantity of leaves must be gradually increased. The windows can be half opened. From the first moment they begin to turn yellow, they must be kept very warm. When they are entirely torpid they require a great deal of heat; when they are perfectly recovered, they only want a moderate heat.

When the silk worms are removed, after their second moulting, and are all recovered, light repasts ought to be given them at first. Four repasts in one day and night will be enough. The next day the quantity of leaves may be augmented by degrees. Some persons open the windows.

From the first moment they begin to turn yellow, they require a good heat; when they are once torpid, a moderate heat ought to be allowed them; when they are all recovered they require a mild heat.

When the silk worms are removed after their third moulting, and they are all revived, three repasts must be given them during one day and night. The first repast ought to be very light; the second lighter than the first, the third the same as the first. If these three repasts be not administered with much caution, the silk worms will feed slowly until the period of their maturity. The second day, the quantity of leaves must be increased by degrees. The windows can be thrown entirely open, and the dormer windows above the frames may be likewise opened.

From the first moment they begin to turn yellow, they require a mild heat; when they are completely torpid a lukewarm heat is required; when they are all revived they require coolness. After each repast a basket of leaves must be taken, and the tour of the shelves made. If an empty place is perceived (upon a hurdle) it must be covered with leaves strewn with rice flour. After the seventh or eighth feeding, (from ten to two o'clock,) cut leaves must be spread upon the hurdles; they must be moistened equally with fresh water; then, after a lapse of some time, sifted rice flour must be spread, being careful to distribute it in a uniform manner. For each basket of leaves a *ching*, (a kind of measure,) of fresh water and four ounces of flour must be used. If the flour cannot be had, a basket of new leaves only must be used; it will furnish a repast for the silk worms of a frame.

[Extract from *Nong-tching-tsiouen-chou*. The powder of leaves, which are spread on fresh leaves, fills the body of the silk worms, (that is to say: is very nourishing,) and disposes them to make a firm and thick cocoon, the silk of which is remarkably strong.]

When the leaves are cut up, moisten them with fresh water: then sift the powdered leaves, and spread them in a uniform manner.

After the great moulting of the silk worms (the third moulting,) from three to five meals of that kind must be given them at certain intervals. When the silk worms approach their maturity, they require light and frequent repasts and moderate heat.

Same work.—If among the silk worms there be any that are backward, that is to say, which do not appear disposed to moult at the same time with the others, frequent supplies of food ought to be given them, in order to accelerate and cause their moulting, at the same time with the rest of the hurdle. When the silk worms do not moult all at once, it proceeds from a species of disease, which dates from their hatching. This method must be followed to remedy it: If among the silk worms which are completely yellow, some change their white color, and begin to turn yellow, much time is not required to become completely so. By the aid of very frequent feeding they will soon overtake the others; in fact, multiplying the feeding hastens the period of their moulting.

But when the greatest number are completely yellow, many blue and white ones are found, they are far from becoming entirely yellow, and frequent repasts given them will be useless trouble; it is impossible for the latter to arrive at the moulting at the same time with the first.

The change of color in the silk worms is the least change that is experienced. When they moult they cease eating, and shed their skin; then they experience a great change. But the greatest of these changes, is their metamorphosis from the chrysalis into butterflies, or moths. When a silk worm is completely yellow, its mouth is shut, it no longer eats but sleeps, or is torpid; it then resembles a man afflicted with some dreadful disease; the blood spreads throughout, its body experiences great modifications. If it remains a day and night without eating, its moulting produces a happy relief.

If, then, there be many blue and white silk worms, and their feeding be too much hurried, their health will be disordered, and a precocious moulting will not produce relief. When those which were blue or white turn yellow, and are disposed to moult, all the others have accomplished their moulting, and are recovered.

When the silk worms begin to recover from their moulting, they want but little food; they resemble a convalescent patient, to whom only slight nourishment is given to repair, gradually, their strength. If while the backward ones moult, the nourishment of the earliest be suspended, they will languish with hunger and weakness, yet you are compelled to wait; and besides, one will be obliged to give them food when the backward ones are recovering. A great number will contract diseases, and very little silk will be gathered from them. For that reason the author of *Tsan-king*, or the *Book on Silk Worms*, says, with much reason, that "the irregular moulting of the silk worms always causes a diminution of silk."

Same work.—When the silk worms are just hatched their color is black. Their food must be gradually increased. Three days thereafter they gradually become white; then they gain appetite. Leaves, not cut so small, must be given them. When they are blue, it is the period of their great appetite. Leaves must then be given them more abundantly, and not cut so small. When they again become white, they feed slowly; their food must be diminished a little. When they are turning yellow they have but a delicate appetite; their food must be again diminished. When they are completely yellow, they entirely cease eating; that is called their moulting. When they are recovered, they change from yellow to white, from white to blue, from blue to a second white color; at last from white to yellow; this is their second moulting. At each moulting they experience the same changes of color. They must be

observed with care, in order to diminish or to increase their food, of which the quantity ought to vary, according to the different situations in which they are found.

The leaves which are given them, ought to be neither wet with dew, nor dried in the wind or sun, nor impregnated with disagreeable smells, for as soon as they have fed upon them, they will contract diseases. If care be taken to preserve, in advance, a sufficiency of leaves for three days, there will be nothing to fear from long rains: the silk worms will never have to eat damp leaves, and at the same time, they will not suffer from hunger. When leaves are again gathered, the heat arising from the accumulation in sacks, must be completely dissipated before giving them to the silk worms. The space of one day and night is, for the silk worms, like unto a year with its four seasons. The morning and evening are the Spring and Autumn; the middle of the day resembles the Summer; and the middle of the night Winter. In these four periods of the day the weather is never the same. When a good fire is preserved in the silk-room, great attention ought to be paid to keep it at the corresponding temperature for each one of those four periods. The degree of heat ought not to be constantly the same. From the time they are hatched, until their second sleep, (moulting,) the silk worms require a moderate heat. The matron of the silk worms, (the person who takes care of them, ought to wear a single garment, (that is to say not double.) She must regulate the temperature of the silk-room, according to the sensation of cold and heat she feels.

If she feels cold, she necessarily will judge that the silk worms are cold, and the fire must then be increased; if she feels warm, she will conclude from it, that the silk worms are too warm, and the fire must then be suitably diminished.

When the silk worms are all asleep, if the sky be clear and brilliant, between ten and two o'clock the windows must be opened, to introduce air and light in the apartment. If the wind be southerly, the windows to the north must be opened; if northerly, the windows on the south side must be opened. The air which enters from a side opposite to the direction of the wind cannot injure the silk worms.

When the silk worms have recovered from their great moulting, (the third moulting,) three repasts must be given them, then the paper that covers the windows, must be cut with a pair of scissors, to allow the air and light to penetrate into the apartment. The silk worms will not be disturbed or incommoded.

After the great moulting, when the windows have been opened, and the paper cut from the windows, if the exterior air is too warm, an unglazed earthen vessel must be placed at the entrance of the door, in which the water must be often renewed, in order that the air may be refreshed in its passage. If the wind raises, if it should rain, or if the night becomes cold, the windows must be closed immediately.

Nong-tching-tsiouen-chou.—The silk worms are of a warm constitution. It is better to make use of a fire during the whole time of the raising.

The following is a method of warming the nursery:

A long stove, placed upon a hand-barrow, must be made use of, so that it may be carried by two men. When the leaves are spread on the silk worms, wait until they have climbed upon the leaves, and then bring in the stove, which must be carefully lighted outside of the apartment. The fire should consist of hot coals; it must be covered over with a bed of straw ashes, to prevent a red and brilliant flame. When the silk worms have finished eating, the stove must be carried back. Afterwards, when other food is given to the silk worms, the same stove must be brought in each time. Then the silk worms will escape the diseases which heat causes; but if the stove be introduced when the silk worms are hungry, they soon become warm. If the stove be introduced soon after having given them food, that is to say, when they are under the leaves, not having had time to ascend them, they will soon be incommoded by the fermentation of their dung, and they will, besides, be overloaded by the leaves spread upon them.

Same work.—When the air of the silk-room is warm, if it be suddenly made cold, the silk worms will lose their appetite, and feed no longer. Then a chafing-dish, filled with clods of dry cow dung, well ignited, and free from smoke, and by the aid of an iron fork, must be moved about repeatedly above the frames. That operation dissipates the cold, which benumbs the silk worms, and they soon feed with an appetite.

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ON THE DISTRIBUTION OF THE SILK WORMS UPON THE FRAMES, AND THE SPACE TO BE ALLOWED THEM.

Thsi-ming-yao-chou.—When the silk worms are moulting, three frames are constantly required. The middle frame is destined to receive the silk worms, the superior and the inferior ought to remain empty. The lower frame preserves the worms from the dampness of the ground, the upper preserves them from the dust of the apartment.

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Wou-pen-sin-chou.—When the silk worms are about hatching, they require cool air. A bed of chopped straw must be spread on the frame; wheat straw must not be used. Every day they must be removed once upon other frames; if they are not changed, it generally happens that white spots come over them.

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ON REMOVING THE SILK WORM.

In removing the silk worms many persons must be employed in order to perform it quickly. If they are left for a long time, heaped up in the baskets, they become heated and perspire abundantly. In consequence, a great number of them fall sick and die. By degrees they will diminish every time they are removed; and those which later arrive at maturity, will only produce small and ill-supplied cocoons.

The dung of the silk worms must be frequently removed. If it be not carried away, they become heated. The heat produces fermentation, and causes a putrid effluvia. Afterwards a large number of silk worms turn white and die.

Whenever the silk worms are removed they must be distributed upon the frames in such a manner as to leave some space between them;

if they are placed too near together, the strongest will feed at the expense of the weakest. It is necessary to make the tour of the frames often, and to visit them with care. Moreover, if the air does not circulate freely in the apartment, and the door be suddenly opened, a fatal wind may penetrate, and a great number, consequently turn red and die. When the silk worms are distributed upon the frames, it ought to be done in a tender manner; they must not be thrown down, or they will be wounded by striking against each other. The health of a great number of silk worms will suffer, and afterwards they will become what are called *laï-lao-ong;* that is to say, *lazy old men.* They leave a red chrysalis.

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Nong-sang-yao-tchi.—Two frames must be placed below the one where the newly-hatched silk worms are. When the sun has risen above the horizon, a frame must be taken away and dried until the setting of the sun. It must then be replaced under the frame where the silk worms are. The next day remove a frame again from beneath, expose it to the rays of the sun and then replace it, as at first. In that manner the silk worms will naturally receive a mild and temperate heat. That frame must be removed as soon as they have eaten, after the second moulting.

Same work.—There are some silk worms which turn white and die; it arises from their having been injured by damp exhalations, within a short time after their hatching. When the sky is clear and serene, take three or four frames and carry them quickly into the apartment of the silk worms, after having exposed them for some time to the rays of the sun. Then as one frame is removed and replaced by another, so continue to change them, until all the frames of the silk worms are sufficiently warmed by the heat of the sun.

The country people, vulgarly say: "when the dung of the silk worms is dry and scattered, it is a sign that they are in good health." When the dung appears in damp heaps, and of a shining white, it announces that the silk worms are sick; the frames must then be quickly changed. But if at the time, when it is proper to change them, a damp rain or a cold wind comes on, it will not do to remove them; the straw of rushes, chopped to the size of a bean, must be taken, and one or two bushels distributed on each frame; it must be spread in an equal manner upon the silk worms. Then a layer of fresh leaves must be placed over them. Soon after the silk worms ascend to eat the mulberry leaves. The bed of rush straw separates the silk worms from the dung, and relieves them from that inconvenience. As soon as the sky has become serene, they must be removed to other frames; if a person has no rush straw, the rice straw will supply its place.

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Sse-nong-pi-yong.—The silk worms produced by three ounces of eggs, which occupy a single frame at the moment of their hatching, will cover thirty frames at the close, or last period of their lives. In general, one tenth of an ounce of silk worms, newly hatched, will furnish a frame of silk worms, in supposing that the frame is as usual, ten feet long, and two wide. If the frames are of a smaller dimension, they ought to receive a smaller quantity of newly hatched worms. If they are too numerous for the space they occupy, they will find themselves close, and, consequently, serious accidents will result from it.

Those persons who intend raising silk worms, to cover more than thirty frames, ought to increase the number of frames destined for the young silk worms, (hatching silk worms.)

Those who only raise a small quantity of worms, can make use of baskets with small borders.

Same work.—The third day, between ten and twelve o'clock, three frames must be placed upon a separate stage. The hatching worms, which have deposited a light bed of dung, must be changed. It must be done with a delicate hand. A quantity of silk worms which (at the moment of their hatching,) occupied a space the size of a square of a chequer-board, ought to be distributed upon the middle frame.

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REMOVAL OF THE SILK WORMS AFTER THEIR FIRST MOULTING.

Sse-nong-pi-yong.—Place four frames upon a separate stage, and the worms which have deposited a light bed of dung must be changed. When they have eaten abundantly, a quantity of silk worms, which, at their hatching, occupied a space as large a man at draughts, will fill the two middle frames; a quantity of silk worms, which occupy a space no larger than a small piece of money, will cover the third frame.

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REMOVAL OF THE SILK WORMS AFTER THEIR SECOND MOULTING.

A quantity of silk worms, which at the moment of their hatching occupy a space no larger than a small piece of money, will cover six frames. When they have eaten abundantly, the same silk worms will cover twelve frames.

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REMOVAL OF THE SILK WORMS AFTER THEIR THIRD MOULTING.

A quantity of silk worms, which at the moment of their hatching, occupy a space as large as two pieces of money, will cover twenty-five frames. When they are all torpid, the bed of chopped straw must be removed; they will then fill thirty frames.

To remove and separate the silk worms, in a proper manner, it must be done with promptitude and tenderness. They must be separated from one another, and an equal space left between them, for fear they should wet themselves, and reciprocally injure one another. The silk worms evacuate freely; for that reason they must, absolutely, be separated. When they have deposited a large quantity of dung, it is necessary to remove them to other frames. If they are not separated they will be too much crowded. If the frames are not changed, they will be injured by the abundant humors which they void. For that reason, these two operations ought to be performed with great celerity.

The silk worms are weak and delicate beings; they suffer much from being rudely handled. When they are small, they must be treated with great care and a kind of affection; but when they have become large, there are few who pay any attention in removing them. They are heaped together, pell mell, for a long time, and they are

tumbled about, or let fall. This defect of care and precaution causes their diseases, and often destroys them; therefore, they should be touched with a light hand, and distributed upon the frames at an equal distance from one another.

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Sang-tsan-tchi-choue.—The silk worms of four moultings are of a different species; they are raised in the same manner as the Spring silk worms, (which have but three moultings.) Only after the third, they must be distributed upon fifteen frames. When they have fed abundantly, they must be spread upon twenty frames; and after the great moulting, (the fourth moulting) they must be distributed upon thirty frames.

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Nong-sang-thong-kioue.—Upon each stage three frames are placed; the first is destined to receive the dust of the apartment, and that below, to intercept the dampness of the ground. A bed of chopped rice straw must be spread upon the middle frame, in order that it may receive the silk worms which are removed. This rice straw must be broken, and softened in an equal manner, upon the middle frame; then a sheet of paper must be spread above, of which the extremities are pasted to the edge of the frame. Upon that sheet of paper the silk worms must be placed.

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Nong-tching-tsiouen-chou.—Hoang-sing-tseng says: When it is desirable to remove the silk worms, rice straw, crushed in a mill, must be spread, in advance, upon other frames. It renders them healthy and active, and preserves them from diseases. Some persons change them by the aid of a net, which they strew with mulberry leaves.

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ENTRANCE OF THE SILK WORMS IN THE COCOON ROOM.

Nong-chou.—The floor of the cocoon room must be boarded with planks of the fir tree, six feet long, and three feet wide. A frame pierced with large holes, must be constructed of the thin bamboo from which arrows are made. In these holes some reeds must be inserted; then long and large bamboo branches, stripped of their leaves must be crossed above. The cocoon room must be covered with a frame work of woven reeds.

The silk worms will then have a place, where they can establish themselves in safety without fear of falling. When the interior of the cocoon room is well arranged, when it affords the necessary depth and proper security, and the frame presents no interval, the silk worms must be successively spread over it. At first, the frame must be a little inclined, until the worms are emptied of excremental matter, afterwards they must be moderately warmed with a small brasier, or pan of live coals. When they have begun to enclose themselves in their cocoon, (that is to say, when their cocoon will have formed a light net work,) the heat must be increased by degrees. They must not stop in the middle of their work; if the temperature be a little too cold, they walk upon their silk and cease to spin. When it comes to be reeled it will frequently break. In general, one will be obliged to have the cocoons boiled, and silk stuff made of it, because it is impossible to reel it from one end to the other.

Thsi-min-yao-chou.—When the silk worms have arrived at the age of maturity, if it happens to rain, it will injure the cocoons; it will be better also to establish the cocoon rooms in the interior of the nursery.

Observation.—The round and oblong cocoons' rooms must be placed outside.

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A parcel of small dry branches must be laid upon the frames, and the silk worms spread on them. When that operation is performed, they must be again covered over with a bed of dry branches. One stage, or story, can support ten large frames.

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Another method.—In place of small dry branches, the stalks of plants may be used, on which the silk worms must be spread. The frames must be suspended, between wooden pillars, with cords, or hooked sticks. Several may be arranged one above another. When the frames are suspended, they must be moderately warmed by means of chafing-dishes placed below. As soon as the silk worms feel the heat, they work industriously; but if they are affected by the cold they will work slowly. The frames must often be visited. As soon as they are warm enough, the chafing-dishes must be removed. If a cool air circulates above in the cocoon room, (while the lower part is warm,) the silk will not be spoiled by the dampness produced by the silk worms; the silk worms that die, will immediately fall, and the cocoons of the other worms will not be injured by coming in contact with them, the dung will not adhere to the cocoons, nor produce any blemish. If the silk be impregnated with dampness, it will be difficult to prepare it for the die; if the cocoon be soiled, the silk will easily break; if the cocoon be defective, it will be good for nothing.

The cocoon rooms furnished with stalks of dry plants, are as advantageous as those we have just described.

Same work.—There are some countries where the place for cocoons is outside, (in the open air;) but if in the evening the air becomes cold, no silk worm can form its cocoon. When the cocoon rooms are warmed, the silk will be fitter to receive the die; besides it acquires lustre and whiteness.

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Wou-pen-sin-chou.—The ground on which the cocoon rooms are established, ought to be high and level. It must be well aired in the interior. Small branches, or dry stalks of plants, must be spread there in an equal manner; afterwards, the silk worms must be distributed there, leaving a proper distance between them; if they are too near, they will create too much heat; if they are crowded, they spin with difficulty; and, moreover, their silk will be difficult to reel. The cocoon rooms must not be established in places exposed to the north-east, nor where domestic animals are raised; neither under trees, above a hole, nor near places covered with manure or stagnant waters.

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Nong-sse-pi-yong.—The following is the manner of establishing the cocoon room: A dry and warm place must be chosen, in order that neither the cold nor dampness can penetrate into the interior of the cocoon room. When the worms approach their maturity, a fire must be lighted upon the ground where the cocoon room is to be located,

until it is perfectly dry; afterwards, the remains of the fire and the ashes must be swept away, and the cocoon room constructed.

Same Work.—Six diseases of silk worms are noted in the cocoon room:

1st. When the silk worms dirty the cocoon room;

2d. When the silk worms fall in the cocoon room;

3d. When they move about without spinning;

4th. When they change in red chrysalis;

5th. When they turn white and die;

6th. When they turn black.

The foulness of the cocoon room arises from portions of leaves which the mature worms have brought with them; they ferment and produce a fatal moisture.

The five other diseases always result from the moisture of the ground, or the cold of the exterior air.

From the Wesleyan Methodist Magazine.

OBSERVATIONS ON PROGNOSTICATIONS OF THE WEATHER [IN ENGLAND.]

By the Rev. Adam Clarke, LL. D., F. A. S.

From my earliest childhood I was bred up on a little farm, which I was taught to care for, and cultivate ever since I was able to spring the rattle, use the whip, manage the sickle, or handle the spade; and as I found that much of our success depended on a proper knowledge and management of the weather, I was led to study it ever since I was eight years of age. I believe *meteorology* is a *natural science*, and one of the first that is studied; and that every child in the country makes, untaught, some progress in it: at least so it was with me. I had actually learned, by silent observation, to form good conjectures concerning the coming weather, and, on this head, to teach wisdom among those who were perfect, especially among such as had not been obliged like me to watch earnestly, that what was so necessary to the *family support*, should not be spoiled by the weather before it was housed. Many a time, even in tender youth, have I watched the heavens with anxiety, examined the different appearances of the morning and evening sun, the phases of the moon, the scintillation of the stars, the course and color of the clouds, the flight of the crow and the swallow, the gambols of the colt, the fluttering of the ducks, and the loud screams of the seamew—not forgetting even the hue and croaking of the frog. From the little knowledge I had derived from close observation, I often ventured to direct our agricultural operations in reference to the coming days, and was seldom much mistaken in my reckoning. When I thought I had a pretty good stock of knowledge and experience in this way, I ventured to give counsel to my neighbors. For my kindness, or perhaps officiousness on this head, I met one day with a mortifying rebuff. I was about ten years of age; it was harvest time, and 'what sort of a day to-morrow would be,' was the subject of conversation. To a very intelligent gentleman who was present, I stated in opposition to his own opinion, 'Mr. P. to-morrow will be a *foul day*.'—To which he answered 'Adam, how can you tell?' I answered, without giving the *rule* on which my prognostication was founded, 'O sir, I know it will be so.' 'You know! how should you know?' 'Why, sir,' I pleasantly replied, 'because I am *weatherwise*.' 'Yes,' said he, 'or *otherwise*.' The next day, however, proved that my augury was well drawn.

About twenty years ago, a Table, purporting to be the work of the late Dr. Herschel, was variously published, professing to form prognostics of the weather, by the times of the change, full and quarters of the moon. I have carefully consulted this Table for several years, and was amazed at its general accuracy:—for though long, as you have seen, engaged in the study of the weather, I never thought that any rules could be devised liable to so few exceptions. I have made a little alteration in the arrangements, illustrated it with further observations, and have sent it that you may insert it in the Magazine, as it has hitherto been confined generally to a few almanacs.

A TABLE *for foretelling the weather through all the lunations of each year for ever.*

This Table and the accompanying remarks, are the result of many years' actual observation; the whole being constructed on a due consideration of the attraction of the sun and moon in their several positions respecting the earth; and will, by simple inspection, show the observer what kind of weather will most probably follow the entrance of the moon into any of its *quarters*, and that so near the truth as to be seldom or never found to fail.

If the New Moon—the First Quarter—the Full Moon—or the last Quarter happens.			
MOON. TIME OF CHANGE.	IN SUMMER.	IN WINTER.
Between midnight and two in the morning.	Fair.	hard frost unless the wind be S. or W.
—— 2 and 4 morning.	cold with frequent showers.	snow and stormy.
—— 4 and 6 "	rain.	rain.
—— 6 and 8 "	wind and rain.	stormy.
—— 8 and 10 "	changeable.	cold rain, if wind W.; snow if E.
—— 10 and 12 "	frequent showers.	cold and high wind.
At 12 o'clock at noon and two P. M.	very rainy.	snow or rain.
Between 2 and 4 afternoon.	changeable.	fair and mild.
—— 4 and 6	fair.	fair.
—— 6 and 8	fair if wind N. W.	fair and frosty if wind N. or N. E.
—— 8 and 10 "	rainy if S. or S. W.	ra. or sn. if S. or S. W.
—— 10 and midnight.	ditto.	ditto.
	fair.	fair and frosty.

Observations.

1. The nearer the time of the moon's change,

first quarter, full and last quarter, are to midnight, the fairer will the weather be during the seven days following.

2. The space for this calculation occupies from ten at night till two next morning.

3. The nearer to mid-day, or noon, the phases of the moon happen, the more foul or wet weather may be expected during the next seven days.

4. The space for this calculation occupies from ten in the forenoon to two in the afternoon. These observations refer principally to summer, though they affect spring and autumn nearly in the same ratio.

5. The moon's change,—first quarter;—full,—and last quarter, happening during six of the afternoon hours, i. e. from four to ten, may be followed by fair weather; but this is mostly dependent on the wind, as it is noted in the Table.

6. Though the weather, from a variety of irregular causes, is more uncertain in the latter part of autumn, the whole of winter, and the beginning of spring; yet, in the main, the above observations will apply to those periods also.

7. To prognosticate correctly, especially in those cases where the *wind* is concerned, the observer should be in sight of a good *vane*, where the four cardinal points of the heavens are correctly placed. With this precaution he will scarcely ever be deceived in depending on the Table.

It is said that the late Dr. Darwin, having made an appointment to take a country jaunt with some friends on the ensuing day; but perceiving that the weather would be unfavorable, sent as an excuse for not keeping his promise, a poetical epistle containing an enumeration of *most* of *the signs* of *approaching ill weather.*—I have *enlarged* these by adding several new ones, and remodelling others; and subjoin it as very useful, and a thing easy to be remembered.

Signs of approaching foul weather.

The *hollow winds* begin to blow;
The *clouds look black*, the *glass is low;*
The *soot falls down*, the *spaniels sleep;*
And *spiders* from their *cobwebs peep.*
Last night the *sun* went *pale to bed;*
The *moon* in *haloes* hid her head.
The boding shepherd heaves a sigh,
For see, a *rainbow* spans the sky.
The *walls are damp*, the *ditches smell*,
Closed is the pink-eyed *pimpernell.*
Hark! how the *chairs* and *tables crack*,
Old BETTY'S *joints* are on the rack:
Her *corns* with *shooting pains* torment her,
And to her bed untimely sent her.
Loud *quack the ducks*, the *sea-fowl cry*,
The *distant hills* are *looking nigh.*
How restless are the *snorting swine!*
The *busy flies* disturb the *kine.*
Low o'er the *grass* the *swallow wings.*
The *cricket*, too, how *sharp he sings!*
Puss on the hearth, with *velvet paws*,
Sits *wiping* o'er her *whiskered jaws.*
The *smoke* from *chimneys right ascends;*
Then spreading, *back to earth it bends.*
The *wind* unsteady *veers around*,
Or settling in the *south is found.*
Through the clear stream the *fishes rise*,
And *nimbly catch* the incautious *flies.*
The *glow worms*, numerous, clear and bright,
Illumed the *dewy hill* last night.
At dusk the squalid *toad* was seen,
Like *quadruped*, stalk o'er the green.
The *whirling wind* the dust obeys,
And in the *rapid eddy* plays.
The *frog* has changed his *yellow vest*,
And in a *russet coat* is dressed.
The *sky is green*, the air is still;
The *mellow* blackbird's voice is shrill.
The *dog*, so altered is his taste,
Quits mutton bones, on *grass* to feast.
Behold the *rooks*, how odd their flight,
They imitate the *gliding kite*,
And seem *precipitate to fall*,
As if they felt the piercing ball.
The *tender colts on back do lie*,
Nor heed the traveller passing by.
In *fiery red* the *sun* doth *rise*,
Then *wades through clouds* to mount the skies.
'Twill *surely rain*, we see't with sorrow,
No *working in the fields to-morrow.*

Hoping that this paper will be of some use to your country readers, I am, dear sir, yours truly,

ADAM CLARKE.

REMARKS ON DR. CLARKE'S WEATHER TABLE.

To the Editor of the Farmers' Register.

I now comply with your request, in sending you for publication, a copy of the Weather Table which was published in the New England Farmer, in December, 1830, with the remarks, &c. annexed. The table will speak for itself; but as you wished my observations relative to its correctness, and as I have had the table since 1830, and noticed particularly how far it was correct, I now give you a few of them. Judging from the observations of seven years, I can truly say no certain reliance can be placed on the rules in general; but still the table will be found more often correct than otherwise in its prognostics of *wet* weather. I am now writing Monday evening, the 4th of June, and it is raining and blowing most severely. It rained on Saturday, and has been cloudy and moist ever since, and now we have a severe storm, which promises to last some hours. Well, by the Almanac, the first quarter of the moon was on the 31st May, Thursday, 25 minutes past 2 o'clock in the morning.

The Weather Table says, that the weather 7 days from Thursday morning, 25 minutes past 2 o'clock, would be on the average cold, with frequent showers. It is cool, and we have had rain before the present violent storm, and the weather thus far has nearly corresponded with the prognostic. It has corresponded as to cool rainy weather, and it will rarely be found to answer to the prognostics in the table more correctly.

My observations have convinced me, that in the summer season there is much more reliance to be placed on the table than at any other season. If any change, quartering, &c. of the moon takes place near 12 o'clock in the day, I have never known it to fail to rain copiously some time in the course of the next 7 days, and most frequently the season is a wet one during those days. If, however, it rains copiously a day or two before such change, occasional showers only occur during the period. The change of the moon on the 23d day of May last, between 11 and 12 o'clock in the

day, was preceded by much rain, and during the 7 days following we had but little rain, although the weather was moist, with occasional showers; and the weather is now more like what the change of the moon on the 23d of May prognosticated. I have thus far found the table much more correct in respect to rainy than as to clear weather. I remember that during, I think, the winter of 1837, the changes, &c. of the moon for a month, indicated wet weather according to the table. We had much rain and no clear weather for three weeks, but the fourth week was clear, although rain was indicated. It will not require very long observations for any person to be convinced, that the changes, &c. of the moon between 2 o'clock in the morning and noon, are much more frequently followed by rain than the evening changes. I think it will also be found, that in the fall and winter the north-east winds accompany the rains in *this state*, instead of the south-west winds spoken of in the table. Being a farmer on a small scale, I have found from sad experience, that for the last five or six years we have had a spell of very wet weather between the 31st of May and the 10th of June, and four days of such weather have already passed this month. The May wheat will probably be much injured, if not destroyed by the rust, in consequence of this weather. If, however, the season was not so backward, the May wheat would be past danger; for some few years since, some crops of that wheat were cut in this neighborhood on the 26th May. Much of it is now in bloom.

In closing my remarks, I have this to say about the weather table. In the summer season, it will often assist the farmer who will attentively observe the winds and the clouds, in judging as to the probability of rainy weather while about to cure his hay and his fodder, &c. A. B. S.

June 4th, 1838.

For the Farmers' Register.

EASTERN SHORE RAILROAD.

Sir—As much with a view to the spirit, as the letter of **** ****, from the Eastern Shore of Maryland, and as to a general discussion of the subject, I address you. The Eastern Shore railroad is to cost, for 118 miles, but $8541 per mile, and, with all the insinuations to the contrary, will not, agreeably to the description given of the ground, cost more than $10,000 per mile; at the same time it will enjoy a prospect of its reasonable share of the 50,000 travellers passing annually from north to south. Fifty thousand, did I say? rather 500,000; for, before ten years shall have elapsed, a number nearer to 500,000, than to 50,000, will pass it. In short, there will be among those who "travel by land *or* by water," sufficient to pay both road and steamers, and to repress feelings like those which have prompted this tilt against the former; for that there will be ample room for both, there is not the slightest doubt.

But how does the Eastern Shore writer sustain himself? He thinks Engineer Kearney's notion of Tangier quite out of the question; forgets that, as in the case of Philadelphia, it may possibly furnish an "excellent winter harbor" for Baltimore, and the probability which exists of the ships availing themselves of that harbor, instead of waiting in Hampton Roads "for a thaw." I think that, were I a Baltimorean, I should hail the project with pleasure; inasmuch as with —— miles back carriage from Elkton, it would give my fellow citizens the same chance of having their merchandise in winter, as Philadelphia. That city, it seems, projects "a railroad from the capes, to strike the railroad at Wilmington, (note A;) and, when this shall be accomplished, foreign goods can be transported to those cities (P. and W.) and cargoes carried by the return cars. By these means Jack Tar may be kept *constantly* at sea, free from the temptations and corruptions of the city, and *perhaps* Philadelphia may regain her commercial ascendency in the country." I cannot see why these arguments, will not as fully and as forcibly apply to Baltimore, as to Philadelphia; and, according to **** ****'s own showing, infinitely more so; for, without the Eastern Shore road, the trade of north Maryland, during the season of interruption, in a great degree, will pass to Pennsylvania. Besides, trade at all times will seek that place where supplies arrive without interruption.

Of the facilities of Tangier as a harbor, I am ignorant; but I had thought some of the British men of war had made good use of it during the last war, and as to the sneers of **** **** relative to "the musquitoes and the marshes," and "the gloomy Siberian forests," they still more strongly enforce on my mind the value of the improvement. It is to form a link in the great chain of coast railroad; (of another from Wilmington to Charleston they begin to speak.) It is to pass through a country requiring it, and thus the services the road may render are incalculable.

In page 744, of your 5th volume, and page 2 of the 6th, I see what is doing for Jersey, by means of marl, and what may be done for Maryland and Delaware, by means of lime; and as the upper Delawares are now boring for finding marl daily, I do not know whether a similar result may not be witnessed on lower Delaware, Accomac, and Northampton. I would observe, I am ignorant of localities, and without good maps; but, I do not fear being found in any grievous error, as my general ground is so solid.

As to *all* the routes from the south, and *vice versa*, there will be room enough, and travel enough, for the whole of them; but, as to "the most eligible one" being by "Richmond, Washington, and Baltimore," **** **** is mistaken, unless he confines himself to those who wish to loiter and spend money in taverns, or seek office at Washington. He allows that three hours would be saved from Portsmouth to Philadelphia, (note B). It is 85 miles by water to Tangier, and may be run in 6 or 7 hours. Doubtless, ere the road is completed, cars will travel with perfect safety, at the rate of 20 miles an hour, and this brings you to Wilmington in 12 or 13—so that I greatly suspect more than three hours will be saved in time; and I know that thrice, or more than thrice that number will be saved in dollars—and especially to families. Of personal conveniences I am silent.

As to "no art" being able to improve "the Siberian forest of Delaware" it weighs as much with me as the ultimate and prophetic clause of the communication. Of the correctness of both, I am in great doubt. Of the powers of the writer in

prophecy, a full proof is *now* (thank Heaven!) to be had as to Atlantic steamer navigation; and, perhaps, ere these lines can appear in print, the return of the Sirius and Great Western will give the *coup-de-grace* to all this sort of vaticination. The pious, the philanthrophic, the philosophic, the political, the mercantile and the mechanical classes will all join, and join most heartily, in prayer for their success.

However, I would add, that an experience of more than half a century has thoroughly and conscientiously answered me, that in an active and enterprising community, (and some acquaintance with such a society as that of the United States has more impressively implanted it on my mind,) there is not the slightest doubt, that, like the Bridgewater canal and the Liverpool and Manchester railroad, *every* road projected in Virginia, will not only *directly* pay the proprietors a large interest, but *indirectly*, to the mass of society, a most enormous profit. "The value of every farm, consequently the wealth, and *perhaps the strength* of a country, greatly depend on an easy and uninterrupted communication by good roads." *(Rees' Cy.)* Of course there is no individual in Virginia, who is not concerned in opening roads either in his own or any other sections; and whether the road be from Abingdon to Winchester, or to Lynchburg, from the Roanoke to the Ohio, or the Kanawha to the James or the Appomatox, from Raleigh, from Wilmington, or from Fayetteville—every one of them will tend to augment her trade, foster her agriculture, and increase the general income of the state—of course, the real value of her landed property—and perhaps be the means, in 1850, of rescuing her from the condition, as to representation in Congress, in which the census of 1840 *must* leave her. Nor has *any* section of the country any thing whatever to fear from roads coming from north or south. The wheels of commerce should revolve with rapidity. Unlike that of fortune, they confer benefit at every turn. This we are all taught by the experience of the last century. Louis XIV. and George II. set a glorious example in France and Great Britain. They were great road-makers

In a country like that of the United States, there is not, nor will there ever be, one highway "of preference," that will "beggar" the other: a sentiment, I regret to see promulgated, and especially from such a state as Maryland; especially as there will be one and one great use for the Eastern Shore railroad. It will form a link in a great chain. It is necessary for the conveyance of the mail *directly* from New York, &c. to the south and south-west. As soon as it is completed, letters will rapidly proceed thither, passing through Raleigh, Columbia, and Augusta, as well as at Wilmington and Charleston. Express mails will be put down; and as soon as others, equally interested, choose to act, no more horses will be killed in carrying presidential messages at extra sessions. Here will be a difficulty, and indeed a difficulty. However, it will be removed when responsible engineers shall attend to their own business, and do not permit their journeymen, and perhaps journeymen looking forward to an interest in the contract to be made on the ground they pointed out, to run roads through morasses; and at an expense *per mile*, equal altogether to the fee simple value of the farms through which they pass; roads which, if laid out in a circuitous way, would not only, 1st. have been better sited; 2d. would have increased the value of land that required it; 3. would have not only furnished a market for wood, but wood for a market, where in winter it is sold for from $4 50 to $7 00 per cord; 4. would, perhaps, have partially rendered the road useful and usable to two, instead of one section of country; for, as you observe, "to adopt the route which will command the most transportation, and yield the most profitable dividends, is a consideration of still more importance than choosing the best (shortest) and most practicable route for a railway;" 5. would not have cost a dollar more—perhaps not as much. Dr. Howard pointed out one of 156 miles for the Charleston and Hamburg railroad. The company, under would-be-wiser advice, ran a straight line of 136. It spent double the money that was necessary, and has now to pay for embankment, as much or more than the whole of his route would have originally cost.

As to any partiality you are charged to have shown to the Petersburg road, you may refer for your exculpation to "Smeaton," at page 622 of Vol. II, of the Register, where the conduct of the Richmond and Petersburg delegations in the house of delegates was discussed, and their opposition to the Portsmouth and Roanoke road condemned. Have not both succeeded, admirably succeeded? The animadversion on their *"powerful scrutiny—their searching sagacity"*—was intended to be severe. But, I fear, "my lords of Norfolk" do not superabound with that liberality of courteousness they expect to receive, and indeed do receive from others. G. L. C.

NOTES.

Note A.—By what route? Why cannot the Eastern Shore railroad be so run as to serve Philadelphia and Tangier? The maps do not show on which side the Breakwater is constructing, and I forget the position.

Note B.—The fact is, that Richmond, Washington, and Baltimore are avoided as much as possible on account of their expense. Philadelphia is not a cheap, but it is a comfortable place. There are two cheap villages in its vicinity. The great object is to reach Philadelphia, &c., &c. There they can see the world, and thence they take their departure; "to various ways they run, &c." The same reasons take so many passengers direct from Charleston to New York. But a railroad into the mountains of Virginia would produce the same effect. Well would it be, if that and more were attempted. New York borrowed $7,000,000 for her canal. In 20 years her productive public property was increased from $2,193,617 to $22,157,142. The revenue from $419,907 to $1,413,-846. On public buildings $500,000 were expended. The school and literature funds were doubled. The state tax discontinued; the people relieved from taxation. How terrible then are the effects of the national debt?

SUBTERRANEAN TRAVELLING.

The line of railway between Lyons and St. Etienne, the largest manufacturing town and the richest coal district in France, is only 34 miles in length; yet, such is the unevenness of the country, and so great has been the anxiety of the engineers

to preserve as complete a level as possible, that there are actually no less than *twenty tunnels* between the two termini. One of these is a mile in length, while another, which is half a mile long, is carried under the bed of a river which crosses the line.—*Mechanics' Magazine.*

GEOLOGICAL ORIGIN AND FORMATION OF SOIL.

Extract from Dr. C. T. Jackson's Geological Survey of part of Maine.

Every attentive person must have observed, that solid rocks, exposed to the combined action of air, water, and different degrees of temperature, undergo decomposition and disintegration, so that they crumble into powder, and that some rocks decay more rapidly than others, owing to their structure, or mineralogical composition. If a rock is porous, or stratified in its structure, water infiltrates into it, and on freezing, expands with such power as to tear the surface of the rock to pieces, so that it readily crumbles. When fire runs through the forests, it heats the surface of the rocks, and by the irregular expansion produced, they are shivered into fragments.

The action of running water and friction of stones, also serve to grind the rocks into powder, by attrition of their surfaces, and the detritus is borne along by the streams, and deposited in low lands, or along their borders.

When a rock contains iron pyrites, or sulphuret of iron, that mineral, by the action of air and water, decomposes, and forms copperas, or sulphate of iron, and the sulphuric acid of that substance acts powerfully on some of the ingredients of the rock, and causes its rapid decomposition. Any person, who has been on Iron Mine Hill, in Gardiner, will fully understand how rapid is this operation, and may there see its results. The oxidizing power of the atmosphere, also, acts powerfully upon the surface of those rocks, which have for one of their components, the prot-oxides of the metals, iron and manganese, and as those oxides take up another portion of oxygen, they increase in bulk, become brown or black, and the stone falls into fragments.

These are a few of the causes now in action, which modify the solid crust of the globe, and it appears that their effects are far more important, than we might at first imagine. Whoever looks upon the muddy waters of the Mississippi, Ganges, Po, the Rhine, and the Rhone, or reads the calculations respecting the enormous quantity of matter brought down from the mountains by those rivers, will at once appreciate the modifying influence of those causes which are continually wearing down the solid matter that forms the mass of our mountains.

Geology teaches us, that such causes were formerly in more powerful operation, and that the ancient world was, from its infancy, subject to violent catastrophes accompanied by powerful inroads of the sea; oceanic currents and tumultuous waves having for many successive periods rushed over the land, and beaten the loftiest crags of the highest mountains. We should then naturally expect, that the earth would present ample testimony of the action of these powerful causes of disintegration of the rocks, and we do observe that a large portion of the loose materials upon the surface, bears proofs of aqueous action and mechanical abrasion. By those ancient convulsions, the detritus of the solid rocks was prepared, and forming the various soils, which we observe, the earth was rendered capable of yielding its rich stores of vegetation, on which a large proportion of the animated creatures depend for their food. From the foundation of the everlasting hills, the Creator began to prepare the world for the habitation of his noblest creature, man, and converted a portion of the solid rocks into soils, which were given as the field of human labor, and to the progenitor of our race it was commanded that he should till the soil.

If we take up a handful of earth, and examine it attentively, we shall readily discover such mineral ingredients, as denote the rocks from which it originated. Thus we discover in a soil numerous spangles of mica, grains of quartz, and white or brown earthy looking particles, which are felspar; besides which, we remark a considerable portion of fine brown powder, which being examined with a microscope is found to be composed of the same minerals, more finely pulverised, and mixed with the brown oxide of iron. It will be at once understood, that such a soil arises from the disintegration and decomposition of granite rocks, and that the oxide of iron was derived from the pyrites, or the prot-oxide of iron, contained in that rock.

A soil arising from the decomposition of gneiss, possesses similar characters, only the mica is more abundant.

Soils from mica slate are made up of a large proportion of mica, mixed with grains of quartz.

Sienite, and hornblende rock produce a dark brown soil, in which there is but little quartz, and a great deal of felspar, and decomposed hornblende.

Greenstone trap-rocks form, by their decomposition, a brown soil, which contains pieces of the undecomposed rock, but the component minerals in the soil itself, are rarely so distinct as to be discoverable. This soil is a warm kind of loam, soft and spongy, easily compressed into smaller dimensions by the pressure of the hand, but not adhesive like clay. It is peculiarly adapted to the growth of potatoes, and is a luxuriant soil for most of our ordinary produce.

Slate-rocks form a soil of a blue color, in which numerous undecomposed fragments of the rock may be discovered. When transported by water, it is deposited in the state of tough blue clay.

Limestone forms various colored soils, according to the nature of the impurities it contains. They are generally of a light yellowish brown color, from admixture of a certain proportion of oxide of iron. This is especially the case with those soils derived from the argillo-ferruginous limestone.

Calcareous soils, if they are rich in carbonate of lime, may be distinguished by their effervescence with acids, and the quantity of this substance may be estimated by the loss of weight which indicates the proportion of carbonic acid, that has been expelled, and since the carbonic acid always occurs in the ratio of nearly 44 per cent. to 56 per cent. of lime, it is easy, by a proportional calculation, to ascertain the quantity of that mineral in the soil.

It more frequently happens, that there is so minute a quantity of carbonate of lime in the soil, as to require a minute chemical analysis for its detection, and few farmers have either leisure or means for such an operation. Examples of such analyses will be presently laid before you.

Talcose slate rocks, when decomposed, form a light brown soil, in which particles of the rock are discoverable, and, on analysis, a considerable quantity of the silicate of magnesia is found, which is one of the chief components of talc.

Red sandstone, or disintegration, forms soil composed almost entirely of grains of quartz, with oxide of iron, and clay, with a few spangles of undecomposed mica.

Grau-wacke, or conglomerate, when disintegrated, produces a light gray soil, full of smooth rounded pebbles, which originate from the undecomposed components of the rock.

Red porphyry is very slow of decomposition, and forms a bright red fine powder, filled with angular fragments of the rock.

I have thus distinguished and described the appearances which characterize those soils that arise immediately from the decay of solid rocks, and various characteristic specimens of each variety may be seen in the cabinet arranged for the use of the state.

Let us next consider how soils are distributed on the earth's surface, and see how their qualities depend upon their situation.

In various sections of this report may be seen recorded the proofs of diluvial transportation of rocks, far from their parent beds, and we have every reason to believe, that this removal was effected by a tremendous current of water, that swept over the state from the north 15° west, to the south 15° east, and we have adduced in testimony, that such was the direction of that current, numerous grooves, furrows, or scratches upon the surface of the solid rocks, in place, and have shown conclusively, that the rocks which we find thus transported, proved to be portions of ledges situated to the north of the localities where their scattered fragments are found.

It is a matter of surprise, that such enormous masses of rock should have been moved so far by an aqueous current; but, when it is remembered, that a rock does not weigh but half so much when immersed in water, as it does when weighed in air, owing to the support given it by the water around; and when we reflect on the fact, that a rock is still more powerfully supported under the pressure of deep water, it may be conceived, that, if a flood of water did once rush over the land, it might have removed large and weighty masses of rock, such as we find to have been the case.

From the observations made upon Mount Ktaadn, it is proved, that the current did rush over the summit of that lofty mountain, and consequently, the diluvial waters rose to the height of more than 5000 feet. Hence we are enabled to prove, that the ancient ocean, which rushed over the surface of the state, was at least a mile in depth, and its transporting power must have been greatly increased by its enormous pressure.

It will be readily conceived, that if solid rocks were moved from their native beds, and carried forward several miles, the finer particles of soil should have been transported to a still greater distance, so we find that the whole mass of loose materials on the surface has been removed southwardly, and the soil resting upon the surface of rocks, in place, is rarely, if ever, such as results from the decomposition of those rocks, but was evidently derived from those ledges which occur to the northward.

If an attentive observer examines the soil in the city of Portland, he will discover, at once, that it is made up from the detritus of granite and gneiss rocks, while the ledges in that city are wholly composed of the argillaceous, talcose, and mica slate-rocks, and granite and gneiss occur in great abundance to the northward.

All the markings on the surface of the rocks, and the scattered boulders of granite and gneiss, which abound in that soil, indicate its origin to have been in the north 15° or 20° west. I merely quote the above locality, on account of its being a spot where most persons will have occasion to examine the facts stated. The various sections of the state present ample illustration of the same fact, and every one who will take the trouble, may convince himself of its reality.

The tertiary deposits of clay, sand and marine shells, were evidently produced in tranquil water, since their strata indicate, by their situation, structure and beds of shells, that the clay was gradually and slowly deposited, allowing time for the propagation and growth of the various shell fish in its several layers. Not so was the diluvial matter deposited, for we find it to bear marks of sudden and violent transportation and deposition, the various pebbles, boulders and erratic blocks of stone being mixed in great confusion. I have formerly mentioned a locality, in Bangor, near the court-house, where, it would seem, there are proofs of a gradual subsidence of the diluvial current, the various particles becoming smaller, as we ascend the embankment, until we come to fine clay, which must have subsided from tranquil water.

We observe, then, that the tertiary deposits were cut through by the diluvial waters, which have excavated deep valleys, and heaped up long ridges called horse-backs, and the general direction of these valleys and ridges, coincides with the direction formerly indicated, as the course in which the current swept.

Although we are informed in the scriptures, that the deluge was ordained for the punishment of wicked men, it is certain, that there was mercy mingled with this dispensation, for the soils were comminuted, transported, and mixed in such a manner, that their qualities were improved, and rendered more suitable for the growth of plants, so that new and more fertile soils were prepared for coming generations, who literally *reap* advantage from the deluge.

Besides the ancient aqueous current, we see every day the action of water modifying the surface of the globe, transporting fine particles from the mountain-side, and depositing them in the valleys and along the margin of running streams. Especially during freshets, when the rivers burst their narrow confines, and spread out over the intervales, do we see rich deposits formed of *alluvial soil.*

Such currents, arising amid decomposing vegetable matters, transport an infinity of fine particles of such matter, and deposit it with the various earthy ingredients, which form our richest mea-

dows, and luxuriant intervale soils. Thus are formed many of those bottom lands, which occur along the river-courses of the western states, and the banks of rivers in Maine, under similar circumstances, are found to be composed of like soils.

A river, coursing its way amid various rocks, carries down and deposits fine particles of every kind, which it meets with in its way.

If the rocks above are limestone, we shall have calcareous soil brought down and deposited by the river. So on the banks of the Aroostook, we find a rich alluvial soil, equalling in fertility the famed regions of the western states, and capable, even under a less genial clime, of producing crops of wheat and other grain, fully equal in abundance with any soils of which we have any records.

From the Genesee Farmer.

ROOTS VERSUS HAY.

We take the following from a report made to the Massachusetts Agricultural Society, by the Messrs. Colts of Pitsfield, Berkshire Co., and we do it to show the immense advantage made in substituting roots for hay in feeding cattle, as well as in the quantity of ground necessary to produce a given quantity of food.

The writer says—"My stock now consists of 1000 sheep, 8 young oxen, 6 cows, a pair of horses, and a single horse. I have raised this season for the use of my stock 5544 bushels of vegetables, and all to be grated and fed out with cut straw, the cattle constantly, the sheep one feed a day, which seems to be a necessary food in our long cold winters: it keeps them in health and also in flesh. As to the respective value of the vegetable food, the following statement will perhaps best exhibit it. I have commenced feeding and shall continue to feed,—

14 head of horned cattle with 20 lbs. of cut straw each per day, 4 cents for each 20 lbs., 56 cents. Also to each, 113 lbs. of roots grated, mixed with straw, 3 cents, 42 cents. And now allow 150 days for the season of feeding at 98 cents, is $147,00. The same stock would require 20 lbs. of hay each per day for 150 days; they would consume 42,000 lbs. equal to 21 tons; at the moderate price of $10 per ton $210,00. Balance in favor of root feed $63, and I am sure the stock will appear far better at the opening of the spring.

You will perceive that the respective value of vegetables for food is six cents a bushel, while hay is at ten, and straw at four. It may be said that there is some cost in preparing food; but this is more than compensated if properly done by the extra quantities of manure made."

Thus it appears that 20 lbs. of straw and 8 lbs. of roots mixed, afford more nutriment, and of course are more valuable than 20 lbs. of good hay, while the actual cost is much less. Fourteen or fifteen tons of roots are a moderate crop per acre, while the average of hay will fall considerably below two tons to the acre. The advantage in favor of the turnip is thus perfectly apparent, and the farmer who persists in mowing his twenty or forty acres, and keeping his stock on hay, when five or six of these same acres would furnish roots sufficient if mixed with the straw which might be grown on the remainder, to keep his animals far better than the hay, and leave the grain crop nearly as a clear profit, is clearly acting against his true interests. Again, we say to our farmers, you did well last year by so extensively entering upon the culture of roots; you will do better this year by greatly extending their cultivation.

From the Maine Farmer.

ACCOUNT CURRENT WITH A PIG.

MR. HOLMES;—I write that farmers and pork raisers may learn whether it is profitable to go largely into the business in this state or not. I have to this end opened an account current with a pig, for which I gave on the first of October at a month old, $1,50

Kept it until it was 16 months old, and then slaughtered it. 14 months of which time I kept it on raw and boiled potatoes—allowing it a peck a day; soon after weaning it did not need that amount—but it had milk or something as expensive; which results in his consuming, in the 14 months, 105 bushels—at 20 cents the bushel, amounts to 21,00

The month on its dam, and 14 months on potatoes, as above, brings it to 15 months old: the other month (for it was not slaughtered until 16 months old,) I kept him on Barley meal, at 67 cents the bushel, and it eat a half peck per day—which amounts, for the last month to 2,40

Tax 30

I charge nothing for attendance, risk, &c., being more than paid in offal and manure.

25,20

When slaughtered, it weighed three hundred pounds, which, at 8 cents the pound, brought me $24,00

Loss, 1,20

But if potatoes cost only ten cents per bushel, (which, in fact, is all they cost in raising,) then deduct from my charges against it 10,50

Making the profit $14,70.

Twelve such would give a profit of $176,40—a pretty item—and plenty of manure.

Some may suppose the pig was not so expensive as I have made it—that it would not eat a peck of potatoes a day, &c. &c. If potatoes are worth more than I have put them at, pork should be too. I write, hoping to hear from others. No doubt September pigs are most profitable—they eat much less than earlier ones in winter; whereas early pigs eat, the first summer, what the later ones should have,—and on new year's day, when the September pigs are 16 months old, there will be very little difference in their size, if the late ones are kept warm the first winter. Some have supposed an early spring pig on the whole most profitable to kill on the first of January following; respecting which, I hope some farmer will communicate his views through the Maine Farmer.

PEN AND INK.

THE COMMERCIAL CONVENTION OF VIRGINIA.

In pursuance of the action and recommendation of the Commercial Convention held at Augusta, Ga., and the invitation and appointment made by the people of Norfolk, a convention of delegates, from various parts of Virginia, was held at Richmond, on the 13th inst., which adjourned on the 16th. There were more than 100 delegates present, and a large proportion of them from the country, and some from remote parts of the state. From the zeal displayed in the assembling and the debates of this body, and the newly excited and growing anxiety among the people in general for improving the present condition, and changing the course, of the foreign trade of Virginia, highly valuable results may be anticipated, even though the *direct* action of this convention may be of small importance. In fact, no practical measure for relief, or particular action, has been agreed on, to forward the great end in view, save the recommendation of an increase of banking capital. But even if the direct action were still less, the indirect operation of this and future conventions cannot fail to be most important and beneficial. What is now required, is to fan the patriotic excitement which has been kindled—to arouse every Virginian, and every Southron, both of town and country, to the evils that the south labors under—and the necessity, and the ready means offered by combined and proper action, for entire and permanent relief. Another convention is invited by a resolution of this meeting, to be held in Norfolk, on the 2d Wednesday in November. It is hoped that every Virginian who earnestly desires to place his country in her proper condition of commercial independence and prosperity, will lend his aid to the forming, and the proper and practical action of that meeting. The place of meeting—the noblest natural sea-port of the south, and the proper site for a great commercial entrepot, and a rich and populous city—will help much to show the advantages of Norfolk as a point for concentrating the foreign trade of Virginia, and to allay the petty jealousies of trade, which would divide, scatter, and thereby certainly destroy, the business and prosperity of the foreign trade of Virginia. We ardently hope that Richmond, Petersburg, and Fredericksburg will all enter separately and largely upon the direct import trade; but as ships can go to the wharves of neither of these towns, it will be decidedly better for their separate and particular interests, and still more so for the general interest of the commonwealth, that Norfolk should be the single point at which all ships bringing foreign goods shall meet, and thence distribute their cargoes to the various importers. The disadvantage of the small increased distance thus given to the passage of cargoes designed for other towns, would be scarcely worth notice, compared to the great advantages of all ships in the foreign trade being concentrated in the most convenient harbor, and where every article of supply, and facility for repairs and accommodation for ships, is ready, and will rapidly increase with the new demand. The jealousies and mistaken rivalships between the traders of the different towns of Virginia, have operated to counteract this proper condition of trade; and, in the pitiful contest, the interests of every party and every town has suffered. Let us, of other towns, concur heartily in permitting and aiding Norfolk to enjoy all her great natural advantages as a sea-port; and every other particular interest, and every portion, of this great state will profit by the prosperity of Norfolk, and the building up there the great sea-port and entrepot of southern trade.

We did not design to offer any thing more, at this time, than merely the results, and the principal report and resolution of the Convention—and even for this, we scarcely have space. Two important reports, one on the state of commerce, and the other, on that of the manufactures of Virginia, are yet to be prepared by different committees, and to be published hereafter; and these papers cannot fail to furnish much valuable information, and important aid to the great objects of the convention. These reports, or extracts from them, we hope will furnish appropriate matter to lay before the readers of the Farmers' Register.

Extracts from the proceedings of the Commercial Convention.

"Mr. Macfarland, (of Richmond,) from the Committee on Commerce, submitted the following report.

"The committee to whom it was referred by the Convention, to inquire into and report, whether the merchants of Virginia can import goods from foreign countries, on as good terms as the merchants of any of our sister states; and secondly, how the foreign trade of Virginia is affected by the want of capital, and in what manner the inconvenience under which it labors may be remedied—submit the following report:

"That the time allowed the committee for the consideration of a subject so comprehensive and interesting as the foreign commerce of the state, has been altogether too limited to enable it to perform its duty in a manner satisfactory to itself. There was not time for many inquiries which belong to such an investigation. The causes that have operated unfavorably to southern commerce, and denied to it the relative importance which was to have been expected from the enterprise and abundant elements of foreign trade of the south, could not be explored in a few hours of hurried consultation. The question especially addressed to the committee, and to which it has been under the necessity of confining its attention, has respect to the capacity of Virginia to maintain a foreign import trade. And if it shall appear not only that we can maintain such a trade, but are possessed of advantages which would enable us to enter into successful competition for it, the inquiry, how we may recover that trade, is the one immediately affecting the interests and business of the state.

"The question propounded in the resolution, namely, whether the merchants of Virginia can import from foreign countries on as good terms as the merchants of any of our sister states, may be answered confidently in the affirmative. They can so import. The markets of foreign countries, and the agency by which foregn traffic is performed, are as freely opened to Virginia capital and enterprise as to any other. From no part of our country can the operation of purchasing abroad, and of bringing home, be performed with

more despatch, or at cheaper rates. This being conceded, as from the obvious nature of the proposition it must be, the question arises, whether it is the interest and policy of the state to foster and encourage a direct foreign import trade.

"Pursuing this inquiry, it is, in the first place, to be remarked, that Virginia has a large export trade—large when compared with the aggregate export of all the states. Her exports for three years ending with December, 1837, averaged $5,265,461. This, of course, gave her that amount of foreign capital, ready to be employed in whatsoever mode that was profitable. Yet, whilst she had it in her power, through the medium of her exports, to obtain directly, and at a reduced cost, the foreign productions demanded by her consumption, the course of trade hitherto has been to obtain those productions in northern cities; thereby receiving them through a circuitous channel, and at an enhanced cost. The average import for the period just referred to, has been less than one-seventh of her exports; and assuming that the difference between those two amounts has been expended in procuring at the north those foreign supplies, which her exports would have enabled her to procure directly from abroad, and assuming further, that the augmented cost of the former operation is equal to fifteen per centum, and we detect an annual loss of about $700,000 incurred by the state from her neglect of the import trade. But that sum is far below the actual annual loss; for fifteen per centum is an under estimate of the addition to the charges upon the foreign supplies coming through the indirect channel referred to, and the sum assumed to be invested in those supplies, is below the actual amount. The loss to the consumer of foreign supplies, so obtained, is equal at least to fifteen per cent. upon the amount of his purchases.

"Now, if any thing be needed to rouse the citizens of our state from the supineness which could overlook so enormous a tax upon its industry and resources, or reconcile them to it, it would seem to be the consideration, that it is with their own sterling money the importation is made, which they submit to receive at second hand at so ruinous a sacrifice. Again; the tonnage which is employed in carrying on the export commerce of the state would be more than adequate to the importation of all the foreign supplies demanded by our whole consumption. But, through the neglect of the import trade, the important advantages resulting from the employment of that tonnage have been lost to the state, and appropriated by those who have had the sagacity and enterprise to enlist it in their service. The amount of which loss is not to be estimated simply by the sacrifice of the benefits which would accrue to us, from the employment therein of domestic capital and labor, but by the sacrifice in addition of the associated trades and occupations that always attend upon the successful prosecution of any one important branch of business.

"Finally—for your committee must be content to suggest some of the prominent, rather than attempt to develop the numerous reasons which commend the import trade to the favor and patronage of our state—another, and not the least, consideration why a vigorous and persevering effort should be made to secure it, is, that it will have the effect of recovering the state from that dependence on northern markets, which has exposed us to suffer by their vicissitudes, without any direct participation in their prosperity.

"Upon the first view of the subject, the causes of the disparity between the amount of our export and import commerce, may not suggest themselves to inquirers generally. The former being large, as we have seen, involving all the facilities which are needed for making purchases abroad; the tonnage which carried out our staples being at hand to be employed in bringing in the productions for which it is to be exchanged; and the simple operation of barter being the natural and cheap mode of effecting that exchange, why is it that, at great pecuniary loss, our people rely upon others for productions that they could procure better by themselves? To answer this question fully, would lead the committee into an investigation, which they have not time to pursue. But among the most prominent causes that may be assigned, the capital required by the import trade, being greatly more than the capital necessary for the export [trade,] may be instanced as not the least influential. The export merchant, through the system of advances that universally prevails, has a large proportion of the capital employed in his purchases speedily restored to him, through the medium of a sterling bill which he is permitted to draw upon his consignee. The like rapidity of purchase and return is not enjoyed by the import merchant. He is exposed to the more tardy process of effecting a sale; and that sale is upon time. It is manifest, therefore, that the amount of capital requisite for the successful prosecution of the latter description of commerce is greatly beyond the capital which will suffice for the former. This consideration, in a great degree, accounts for the comparative languishing condition of the import trade, and the reluctance of our merchants to engage in it. The capital of few, comparatively, is adequate to its burthen; and the exigency resulting therefrom has not hitherto been met and provided for by the granting of those banking facilities, which a timely and earnest appeal to our legislature would doubtless have obtained. And this brings the committee to the consideration of the second resolution.

"It is the opinion of your committee, than an increase of banking facilities, so that the important interest which they now seek to recommend to general and spirited support, would readily obtain the accommodation of which it stands in need; accompanied by a patriotic determination of all classes of our citizens to support a course of domestic industry so auspicious to private and state wealth, comfort, and independence, and accompanied also by a judicious system of internal improvements, so that every section of our extended territory may be accommodated, and their rich resources developed, would secure to our state an extent of foreign commerce that would be the source of untold benefits to all classes of our people, and of power and consideration to our commonwealth."

Mr. Ruffin (of Petersburg) offered the following substitute for so much of the report as recommends the increase of banking capital.

"The desired change of the course of trade may be still more aided and secured by the action of the state government, which can be so powerfully wielded, according to the direction

given, either for the benefit or the prostration of the best interests of the commonwealth. This may be done in various modes; but only one will be here specified, and recommended, as being the most obvious, and the most intimately connected with the practical operations of trade. This is, to increase the banking capital of Virginia to the amount required for the trade and business of the state, and at the same time to reform the system of banking, so as to guard as much as possible against the strong tendency of all such institutions to sacrifice the general interest of the country whenever the separate banking and stockholding interest can be thereby benefited. The reformation of banking operations is required at least as much as their extension; and both ought to be carried through together. Heretofore, Virginia has suffered her full share of the great evils of the general banking policy and operations of all the states, and has profited by but few of the advantages which a full participation in the direction of the operations would have secured to us, as they have, and in a great degree at our expense and loss, secured to the northern states. It is highly expedient that Virginia should enjoy more of the benefits of the banking system, and be better secured from its dangers and evils. Our state policy heretofore has been to refuse the good belonging to, or to be drawn from banking, and to receive, and submit to its worst evils, inflicted by the hands of others over whom we had no control, and whose gain was our loss."

This amendment was rejected, ayes 21, noes 60; and the report was then adopted, together with the following resolution.

"*Resolved*, That a vigorous and persevering effort be made to build up and sustain a large and increasing foreign import trade—that a committee of merchants be appointed, to sit after the adjournment of the Convention, to prepare an address to our fellow-citizens, unfolding the importance of such a trade, and the ready capacity of Virginia to obtain it—stating the support the trade will derive from an increase of banking facilities, under such restrictions and modifications as the wisdom of the legislature may devise, and from an addition to the banking capital, if the addition authorized by the existing laws shall be found, after a sufficient trial, to be inadequate to sustain and support the various interests of the commonwealth—and stating the aid the trade will derive from a judicious system of internal improvements; and that the legislature be respectfully requested to meet the advances of any neighboring state, who may have enacted laws to transport her products and merchandise into Virginia."

SHEEP GRAZING AMONG GROWING CORN.

To the Editor of the Farmers' Register.

Baltimore, June 20, 1838.

A few days since, I took a ride into the country with a friend, and, on passing a farm about twelve miles from the city, we observed a *flock of sheep quietly feeding in a corn-field.* The corn was about a foot high. Supposing we should be doing the owner a service, we took speedy occasion of informing him of it. He laughed, and said they would not hurt the corn; that the sheep were purposely kept in the field for the purpose of keeping down the blue grass, &c. On further conversation, he informed us that sheep will never touch the green or growing corn plant; that they must be very hungry if they do, &c. Having seen the sheep in his corn, and observed his undisturbed manner on being informed of the fact, I could not, of course, doubt the correctness of his theory; but I had never before known the fact, and thought there must be many others equally ignorant. If sheep will not only not injure the corn, but contribute to its culture by destroying the grass, and especially blue grass, I suppose it would be a great object with all corn-planters to have large flocks of them. I have mentioned the circumstance to several persons, who promise to try their sheep in their corn-fields. Pray, sir, is this old or new to you? If the former, say nothing about it; if the latter, let your readers have it.

GIDEON B. SMITH.

JAUFFRET'S NEW MANURE.

The conductor of the Gardener's Magazine speaks, in the May No., as follows of Jauffret's new manure, of which several notices have been lately published in the Farmers' Register.

"We have obtained satisfactory information from Paris respecting Jauffret's manure, and have also examined a heap of it prepared under the direction of M. Lozivy, at Durnsfield Lodge, near Wandsworth. The secret composition is given in detail in the *Repertory of Patent Inventions*, No. 51, p. 166; and we shall give it, with our opinion on the subject, and the facts on which that opinion is formed, in our next Number."

SINGULAR DISCOVERY OF A SUBTERRANEAN RIVER.

A singular discovery was made in Blaen-y-nant lead mines, near Mold, Flintshire, a few days ago. The workmen at the end of one of the levels were surprised, and obliged to run for their lives, in consequence of an immense rush of water suddenly bursting in upon them. After three days the water totally disappeared; and, on cautiously proceeding to the place, they found an opening of about four inches diameter, through which the water had issued. Hearing a sound as of a heavy run of water inside, they enlarged the aperture so as to admit of their passing through, and found that it was the bed of a subterraneous river, which in all probability affords the principal supply to the far-famed St. Winifred's Well, at Holywell, from which it is distant about twelve miles. The stream being then shallow, they explored it about sixty yards down, and were astonished to find several large caverns to the right and left, from the roofs and sides of which were suspended numerous and beautiful specimens of white spar or stalactites. The company are in high spirits, these appearances being considered favorable for a large lodgment of ore.—*Shrewsbury Chronicle.*

From the Southern Agriculturist.

OF THE SUCKERS ON CORN.

Fonthill, May 2, 1838.

Dear Sir—I made a trial last summer of retaining the suckers on a part of my corn, which was sufficient to convince me, that nothing is gained by taking them away. From some cause last season, I saw more suckers shooting out from the roots of my manured corn, than I think I had observed before; and at the request of a gentleman, (to whom I had shown them, with the remark that I did not think that nature would, in relieving itself, do a substantial injury to any plant,) I preserved them, and watched their progress to maturity. They grew along with the parent stalks, (and becoming more and more detached as the season advanced, and as they acquired support from the roots which they sent out,) tasselled at the same time, and a great many, though not all, bore ears, at the proper places. And I have satisfied myself, at least, from the experiment, that by leaving the suckers, I made as much corn —certainly much more fodder—and saved the labor, in a busy season, of taking them away.

COTTON.

From the Southern Agriculturist.

ON FEEDING HORSES ON PEASE, TO SAVE BLADES.

May 10*th*, 1838.

Mr. Editor—Agreeably to my promise, you will find below a piece on feeding horses on pease, to save blades. In 1836, I believed that I had not made as many blades, as I thought would serve my horses the year; and I had a fine crop of pease. I fed my horses on pease in the haums at night, and at 12 o'clock, and in the morning, on corn. I gave each horse half a bushel of pease in the haums. My horses got fat on them, and they did a great deal of work all the time. This piece may benefit the up-country planter, more than the down-country planter, as they have the advantage of marsh, that they can use by the first of May. But if the up-country planter's blades happen to give out by April, he has nothing that he can feed on in place of the blades, but oats, and they do not come in until the middle of June. I have been pursuing the same course with my horses this winter, though I had a plenty of blades, and I intend to continue to do it as long as I am a planter.

Hoping this may benefit some planters, I am yours, respectfully,

COLLETON.

From the Genesee Farmer.

PRUNING TREES.

A most injudicious system with regard to pruning trees appears to have been adopted by many of our farmers. A tree is neglected until it is comparatively old, and the top a dense mass of brush rather than properly directed branches, and then is attacked by the farmer with axe and saw, and nearly all the top cut off at a single operation. In the first place trees ought never to be left so long without pruning, where it is ever to be expected or required. The pruning should be made annually, and keep pace with their growth. In this way such ruinous loppings off of wood will be prevented, and the injuries that result from such a course be avoided.

When a fruit tree has grown with a thick bushy top, the bark of the central branches is tender, and when suddenly exposed to cold winds or hot sun, the effect cannot be otherwise than prejudicial. If the pruning is performed gradually, or annually, the bark is alike adapted to resist the influence of the seasons, and is not apt to become thick and tight, or tender and cracked. Perhaps the peach suffers more from injudicious pruning than almost any other tree; and where any considerable part of the top is cut off at once, it is most usually fatal. A mode which has been adopted to a considerable extent in the peach growing districts of New Jersey obviates in a great measure this difficulty, and also another serious one, the danger of the branches breaking when heavily laden with fruit. After the tree is planted where it is to grow, it is allowed to stand till it becomes well rooted, when it is cut off near the ground. Sprouts immediately spring up around the root, and of these five or six of the best situated ones are selected to remain, and the rest are carefully eradicated. These shoots are either budded, or suffered to grow up the natural fruit, according to the pleasure of the proprietor. The advantages derived from this course are these: these offshoots spread more laterally than would branches from a single trunk, and of course the sun acts upon every part of the branches more fully; and when they are loaded with fruit, they will fall to the ground in every direction, rendering the gathering of the fruit easy, and preventing the breaking down of the tree.

The experience of the best fruit-growers of the country, as well as the deductions of philosophy, would seem to point out the summer as the most suitable time to prune trees, as the material for covering the wounds is already elaborated, and will be immediately applied by the remaining branches. Professed nurserymen are more careful in this respect than the common farmer; pruning is by them carried on upon more of a system, and hence trees managed by them rarely are called to undergo such amputations of the top, as those where less attention is given them, and perhaps no pruning attempted. Much of the excellence of fruit, and the productiveness of the tree is dependent on pruning, and by commencing early, and following up a system carefully, such a shape may be given to the crown, and such a direction to the main branches, as most effectually to secure the advantages of sun and air.

From the Genesee Farmer.

BREEDING IN AND IN.

The judicious breeder will not too long confine himself to his own stock, unless it be very large. The breeding from too close affinities—the breeding *in and in* as it is called, though it has many

advantages, to a certain extent, in the hands of most skilful and judicious breeders; though it may be pursued until the excellent form and quality of a breed is developed and established, and was the source whence sprung the superior cattle and sheep of Bakewell, and to some extent of the superior short horns of Mr. Colling; yet, to it also must be traced the speedy degeneracy—the absolute disappearance of the New Leicester cattle, and, in the hands of many an agriculturist, the impairment of the constitution of the New Leicester sheep.

Bakewell was a master spirit in breeding, and it cannot be denied, produced a breed of cattle worthy the efforts of such a skilful agriculturist. The principle on which he seemed to act was novel, bold, and for a time a successful one. Some of his cattle were extraordinary illustrations of the harmlessness of such a system, but he had a large stock on which to work, a veil of mystery was thrown over the most of his proceedings, and no one knew his occasional deviations from this rule, nor his skilful interposition of remoter affinities, when he saw, or apprehended danger.

But what has now become of the New Leicester or Bakewell cattle? where are they to be found? It was a bold and successful experiment, and seemed for a while to answer the most sanguine expectations of that skilful and spirited breeder.

In districts, in which experiments were carried on, it established a breed of cattle equalled by few; and it enabled the long horns to contend, and often successfully, with the heaviest and best of the middle horns. But no sooner had the master spirits of the day disappeared, than the character of the breed began imperceptibly to change. It had acquired a delicacy of constitution inconsistent with common management and keep; and it began slowly but undeniably to deteriorate. Many of them had been bred to a degree of refinement, that the propagation of the species was not always certain. The breed itself gradually diminished, in some places it almost disappeared. The reader may scarcely give credit to the assertion, but it is strictly true, that in 1833 there was not a single improved Leicester on the Dishley farm; nor a dozen within the circuit of as many miles. It would seem as if some strange convulsion of nature, or some murderous pestilence, had suddenly swept away the whole of this valuable breed.

The above remarks are in substance taken from that valuable treatise on British cattle, before alluded to. In Kentucky, though the principle of breeding *in and in* has met with general disapprobation, yet, it has been more or less practised by many breeders. To one of whom allusion will be made, not from unkindness, but merely for example, for he, like Mr. Bakewell of England, is a monument to illustrate the propriety of the practice. This breeder, (now less notorious) had, several years since, one of the finest herds of milking and breeding blooded cattle in Kentucky, and deservedly had high reputation as a breeder. But vainly imagining that they were far superior to all others, proper crossing was neglected, the stock began to diminish in size; many of them became hornless; and their constitutions were impaired, in consequence of which they suffered more from cold, in winter, and were more liable to disease, in summer; the murrain soon got among them, and played such sad havoc in one short season, that at present, only a few venerable animals remain of that once superior but ill-fated herd.

With this short digression we will again quote our valuable author. "It has therefore become a kind of principle with the agriculturist to effect a change in his stock every second or third year; and that change is most conveniently effected by introducing a new bull. This bull should be as nearly as possible of the same sort; coming from a similar pasturage and climate; but possessing no relationship—or at most a very distant one—not related to the stock to which he is introduced. He should bring with him every good point which the breeder has labored hard to produce in his stock; and if possible some improvement; and especially where the old stock may have been somewhat deficient; and most certainly he should have no manifest defect of form, and that most essential of all qualifications, a hardy constitution, should not be wanting." R. W. S.

STATE OF THE WHEAT-CROP.

The present wheat-crop throughout Virginia, and other adjacent states so far as we have heard, is the best, in quantity and quality combined, that has grown for many years—if not the best that has ever been made. Some partial disasters, on particular farms, have been suffered, from chinch-bug, hessian fly, or rust; but nothing worth naming as affecting the general crop of Virginia. A more considerable cause of diminution will be found in the circumstance that there is less surface now under wheat than a few years ago; as the repeated losses and failures of wheat have caused almost every farmer to withdraw some portion of his field (the part promising the least product,) from wheat-culture, and substituting oats or rye. The crop is now so far advanced in lower Virginia, that it may be considered out of danger, except from continued wet weather during the time for harvest; by which cause we have known one crop (in 1821) nearly lost, after it was ripe enough to be reaped. The weather now (June 25th) is very favorable.

Harvest was begun on some of the most highly improved marled land on James river on the 18th inst., with purple-straw wheat—which was as early as (what is called) May wheat, elsewhere, was ready for the scythe. There has been a predominance of cold weather for the time of year, through the last 60 days, or more, and the growth and ripening of wheat were every where more backward than usual. If the crop should prove as abundant as we now expect, it will be a most important means of restoring the commercial prosperity of the United States, and especially of Virginia, which has latterly been so wofully eclipsed.

There is also a prospect of good prices for, as well as good products of wheat. For crops to be delivered before August, at landings on James river (tide water,) $1.50 per bushel is offered; and sales have been made on these terms, by most of those who expect to be able to effect so early a delivery. Afterwards, prices must be considerably lower, unless there should be a failure

of the European crop, and a consequent great foreign demand; neither of which contingencies is at all probable at this time. According to these views, every farmer should endeavor to get his crop to market as early as possible.—Ed. Far. Reg.

June 23d.

From the Farmer's Cabinet.

SUMMER PRUNING OF TREES.

"Experience is the best teacher."

The right time for pruning trees is after the first running of the sap, from the middle of June to the first week in July. The reasons for it are—in the first place, when a tree is in full leaf you can better judge what branches to remove, than when it is leafless. In the next, the wound heals over more kindly and effectually after summer trimming, than after winter or spring pruning; and lastly, suckers are not so like to shoot out after midsummer trimming, as if it was performed in the spring of the year. The writer of this has performed the operation extensively on a large number of trees of various kinds, the last week in June, with the greatest success, and has never seen a tree, in the least degree, injured by it. The practice is now becoming general among those who have the most knowledge of the subject, and it is hoped that those who are timid at departing from an old custom, will make a trial of it this season, on a scale proportionate to their faith, and rest assured diappointment will not follow the experiment.

Pyrus.

From the Mining Journal.

FLINT IN WHEAT.

The scoundrels who burn wheatstacks in the country leave behind them some curious chemical results. "Swing" is a grand experimentalist. There are found in the embers, lumps of coarse glass, which are the result of the fusion of the silica, or flint, which wheat straw in particular is found to contain in very considerable quantities.

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ERRATA.

The following errata were caused by the illegible writing of the several pieces in which they occur:

No. 2, p. 78, col. 2, at end of 3d paragraph, for "*shown*," read "*slow*."

No. 3, p. 164, col. 2, line 3 from bottom, for "*gents*," read "*goats*."

No. 4, 202, col. 2, line 17 of editorial remarks, for "*extreme*," read "*extensive*." This last error is corrected in part of the impression.